

**REVIEW DRAFT**

**STATE COASTAL MANAGEMENT EFFECTIVENESS IN  
PROTECTING  
BEACHES, DUNES, BLUFFS, ROCKY SHORES:  
A NATIONAL OVERVIEW**



**Prepared by Tina Bernd-Cohen and Melissa Gordon  
As Part of the Sea Grant National CZM Effectiveness Study  
for the Office of Ocean and Coastal Resource Management  
National Ocean Service, NOAA, DOC**

**June 1997**

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# **STATE COASTAL ZONE EFFECTIVENESS IN PROTECTING BEACHES, DUNES, BLUFFS AND ROCKY SHORES: A NATIONAL OVERVIEW**

## **EXECUTIVE SUMMARY**

### **The Importance of the Coastal Zone Management Act for Protecting Beaches, Dunes, Bluffs and Rocky Shores**

Prior to enactment of the federal CZMA, state efforts to address protection of natural shoreline features such as beaches, dunes, bluffs and rocky shores were highly variable. State coastal management programs (CMPs) developed since passage of the CZMA were designed specifically to balance resource protection and development. State coastal programs have resulted in more attention to issues such as erosion, sea level rise, and cumulative adverse impacts resulting from development on receding beach and bluff shorelines and sensitive natural habitat areas. State CMPs have been at the forefront in addressing shoreline use conflicts such as the demand for shoreline armoring to protect existing upland structures to the detriment and loss of natural beach systems. Beach nourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beaches through shoreline hardening. Likewise, some coastal states have funded research into sand loss from inlet dredging and have demanded that beach quality sand from inlet dredging be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CMPs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

State CMPs serve as the institutional focus for addressing ongoing competing public and private demands for the use of our limited and sometimes fragile coastline resources. Our understanding of natural shoreline processes and the impacts of human development on these processes has grown. Today, we are no longer building as close to the shoreline. The development that does occur is better built to withstand coastal storm events. Efforts are made to guide access across fragile vegetated dunes. We are becoming better stewards of our natural coastal heritage through state CMP efforts. Balancing private property rights with natural resource protection goals remains a challenge.

### **Summary of Research Findings and Conclusions**

**The national objective of protecting coastal resources is being achieved** through implementation of federally-approved state coastal management programs. State CMP efforts are effective overall in addressing protection of beaches, dunes, bluffs, and rocky shores, given that the CZMA requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion

of recreational use of the shoreline. Determination of CMP effectiveness has been based on process indicators and case examples.

**Coastal states are utilizing a wide variety of tools to achieve resource protection** including regulatory setbacks and controls over shoreline development in combination with planning, stewardship of state lands, coastal land acquisition, and research and public education about shoreline processes and human interactions. The primary tools employed are regulatory controls over land and water uses along the coast through setbacks, permits for coastline development, and restrictions on access and habitat destruction. All but three coastal states identified protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool.

Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

**More Systematic Resource Protection Occurring** - State coastal management programs have provided more systematic, extensive and intensive planning and review of projects along the shoreline resulting in minimized adverse impacts of improper development and erosion on natural systems and adjacent properties and structures. Greater attention has been given to cumulative effects of individual permit decisions. The measurement of erosion rates for establishing construction setbacks, the long-term adverse long-term effects of shoreline armoring on natural beach sand transport, and opportunities for non-structural solutions to coastal erosion. As a result, less inappropriate development is occurring in hazardous areas such as migrating beaches and eroding bluffs.

**All but two coastal states have made significant changes to their program tools in the way they protect resources.** Significant changes have often included expansion of the geographic area or types of activities covered by shoreline setbacks or regulations and changes to limitations on shoreline stabilizations. Most give greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shoreline using structural measures. These changes complicate assessment of program effectiveness, using outcome indicators.

**Regulatory tools are the most significant tools employed nationwide** to protect shoreline resources, because the majority of the oceanfront shoreline is in private ownership and is subject to significant shoreline change and development pressures. The scope, policies, and provisions of state coastal regulatory programs afford greater natural resource protection. State coastal programs protect beaches, dunes, bluffs and rocky shores through setbacks, regulation of shoreline development and shoreline stabilizations, restrictions on pedestrian access, vehicular access, and habitat protection, and permit compliance/permit tracking systems. Most coastal states employ construction setbacks from the shoreline to provide a natural buffer between development and the water. Almost all coastal states regulate activities within defined coastal construction control areas in ways that minimize adverse impacts on the natural shoreline resources and protect critical habitat areas. Most coastal states regulate the use of shoreline stabilization structures to minimize adverse impacts on beach systems. However, only a few coastal states prohibit shoreline stabilization structures, thereby placing protection of beach systems as a policy priority over protection of upland structures. Many coastal states restrict pedestrian and vehicular access along portions of the shoreline. Pedestrian access restrictions channel human encroachment along boardwalks or dune crossovers, minimizing dune destabilization and limiting adverse impacts on fragile shoreline resources. Vehicular access restrictions keep vehicles off sensitive coastal habitat areas or limit vehicular use to government vehicles or off-road vehicles in areas planned for their use. Almost all coastal state have permit compliance programs to enforce their regulations and permit tracking systems.

**Planning tools, when combined with regulatory, are used effectively to protect natural resources.** Most coastal states with beach or bluff resources employ some type of planning tool. Locally-delegated

permitting combined with mandatory local planning in eight coastal states provides the key management tool in protecting beaches, dunes, bluffs and rocky shore resources. Planning programs are more effective when combined with implementation through state regulation or local land use regulations, zoning and subdivision ordinances and other actions.

**Stewardship of coastal lands, through state land management and acquisition, is an important component of all state coastal programs.** All coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore. Most coastal states have natural protection areas and guided accessways and many have acquired additional coastal land holdings. Almost half of the coastal states use boardwalks or dune crossovers to protect dune vegetation and minimize adverse impacts on natural resources and employ sand fencing and dune creation to restore the natural function of damaged dune systems. Over half of the coastal states use beach nourishment to recreate recreational beaches which are eroding away. Eleven coastal states have chosen to armor or repair existing shoreline stabilization structures in high erosion areas, primarily to protect coastal highways or other public infrastructure investments.

**Insufficient nationally compatible outcome data is available to determine on-the-ground effectiveness:** It is not possible to determine the on-the-ground effectiveness of state CPM regulatory, planning, state land management or acquisition programs, due to the scarcity of outcome data. Although about two-thirds of the coastal states have computerized permit tracking systems, no states keep statewide databases on the miles affected, the area affected, or the resources affected by permits approved for coastline activities. Regarding states with setbacks, the regulatory jurisdiction varies making cross-state comparisons difficult. States which delegate coastal permitting to local governments do not maintain multi-year databases on local permits. Data on conditions attached to permits are contained in paper files, not on permit tracking systems. Few states have any data on the results of pedestrian access and vehicular access restrictions and protected habitat areas.

Most coastal states with approved local plans have information on the number of plans approved but no statewide and longitudinal data on results of local plan implementation. For states with adopted special area management plans (SAMPs) or other specialized plans, outcome data is also scarce. Although all coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore, only some states have inventory data on their coastal land holdings such as number of shoreline miles in state parks or percent of shoreline in public ownership. Several states are active stewards of their public coastal land holdings but outcome data is scarce regarding accessways installed, dunes restored, beaches restored, and other protection results. Of the coastal states which utilize acquisition, most have some data on the number and/or acres of coastal lands acquired. However, for most states, this data is not broken-down by type of resource area acquired and very few states have data on amount of money spent or acquisition priorities.

Determining "effectiveness" of state coastal program in protecting natural coastline resources based on *on-the-ground outcome indicators* is elusive. Determining the "effectiveness" of state coastal programs in protecting natural coastline resources based on *process indicators* and case examples is more possible, but still difficult. Case examples can be effective in illustrating how a management tool has been implemented in a certain geographic area and the results of such implementation.

**Competing Demands for the Use of the Shoreline and Competing Government Policies Continue to Require Balance** - State CZM programs continue to face decisions regarding competing demands for recreation and tourist development, protection of existing threatened properties, and the rights of private property owners versus public health and safety. Shrinking federal and state dollars for state CZM program administration, coupled with increased demand and expectations for CZM services, is a long-term concern for coastal programs. Several federal agencies, state CZM programs, local coastal governments, and other non-profit organizations each play a role in managing our nation's coastline resources. Inconsistencies between certain federal agency programs and state CZM objectives is an ongoing concern. For example, the FEMA flood insurance program and the federally-funded shoreline

protection projects of the USACE achieve objectives which undermine some state CZM natural resource protection objectives. The unique role of state coastal zone management programs has been to focus attention and resources on improving the state and local land use controls and other tools to minimize the adverse impacts on natural resources.

## **Recommendations**

**Develop a computerized CZM database** - OCRM should seek funding from Congress to establish a computerized monitoring and tracking program for state and federal agency CZM activities, the results of which should be published in a biennial state-of-the-coast report to Congress. This should include a computerized coding system and an information tracking and recovery system for all information submitted by coastal states. OCRM should prepare up-datable state CZM program summary files for each coastal state with information about the state program, periodic changes to the program, program activities, CZM projects undertaken, results and reports produced.

**Share Information Through the Internet** - OCRM should create a home page on the Internet and a CD-ROM of the National State of the Coast Report and National CZM effectiveness study and other CZM databases.

**Incentives for Coastal States to Refine and Expand their Process and Outcome Data Collection and Record Keeping** - OCRM should seek funding from Congress to form a coastal states task force with the objective to change the coastal states reporting requirements under 306, 309, and 312 to better address results of state CZM activities and their effectiveness in meeting state and national CZM objectives. This should include accepted methods for organizing, collecting, storing, and reporting accurate and precise data on program activities and results which include trend data usable in future assessments of CZM effectiveness.

OCRM should also encourage coastal states to improve their daily record keeping and yearly reporting to OCRM on program implementation and results. They should be encouraged to continue to develop and refine computerized permit tracking systems regarding permitted activities to refine the individual permit entries to include data on type of project, area and resources affected, length of shoreline affected, size of project, permit restrictions/conditions and other data which, when analyzed yearly, could assess the individual and cumulative impacts of projects permitted along the coast. OCRM should encourage states which delegate implementation to local governments to monitor, collect and report on local implementation and results. States should be encouraged to explore the use of in-depth case studies as a way to provide more meaningful explanations of how CZM works and the on-the-ground results, rather than relying on case examples and success stories. State should be encouraged to explore the use of aerial photo interpretation for measuring long-term changes in develop and resources along the coast.

**Federal agencies should monitor changes to the coastal environment and report on changes every Five years.** OCRM should compile data from U.S. Bureau of the Census on population changes in coastal counties. Congress should fund the appropriate federal agency to conduct aerial photo interpretations of shoreline development and changes in development patterns. USDOl should compile data on private development occurring on designated Coastal Barrier Resources Act (CBRA) units and federal/state agency actions affecting CBRA designations and implementation success. USACE should be funded by Congress to conduct follow-up national shoreline studies on erosion, shoreline armoring, beach nourishment, and public ownership of the coast. USDOl/FWS should compile data on coastal endangered species and habitat loss/protection changes and role of federal and state agencies in this effort.

**Utilize the Section 309 Assessment Process to address issues associated with shoreline change.** OCRM and the Coastal States should continue to utilize the section 309 Assessment process to address substantive issues associated with the protection of natural coastal systems. Significant changes to state coastal programs such changes in activities exempt, shoreline armoring allowed and the landward extent

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of regulatory jurisdiction should be carefully scrutinized for their long-term effects on natural coastal systems.

**Study Approach** This research project involved three stages. *Stage I* included data collection and creation of 29 state profiles. Five states were selected as pilot states to test our survey instrument, followed by surveys of all remaining coastal states. The state profiles documented state tools and available outcome data on protection of natural beaches, dunes, bluffs and rocky shores. Case examples were compiled as part of the state profiles. Data collection also included a search of evaluation literature, national context factors, and national data sources on resource protection. *Stage II* involved evaluation of state CZM program effectiveness in protecting beaches, dunes, bluffs and rocky shores, drawing from the state profiles and national summary tables. *Stage III* involved creation of the national CZM effectiveness evaluation synthesis report. The national overview report contains background and context information; a summary of the regulatory, planning, state land management and acquisition tools used by coastal states to protect natural beaches, dunes, bluffs and rocky shores; the importance of resource protection to coastal states; and the key role, process indicators and outcome indicators of state CZM program effectiveness in protecting natural shoreline resources. The report also contains recommended improvements related to tracking and document state CZM program effectiveness in meeting CZM objectives.



# 1 INTRODUCTION

The purpose of the National Coastal Zone Management (CZM) Effectiveness Study has been to assess the overall effectiveness of the state CZM programs in addressing five core objectives of the Federal CZM Act. This section of the report investigates the effectiveness of coastal resource protection at the state level. In particular, this section looks at the coastal management tools state CZM programs employ to *protect natural beaches, dunes, bluffs and rocky shores* and the effectiveness of these management tools in achieving national policy objectives. Both process and on-the-ground outcome measures are used to assess CZM program effectiveness. This section also contains recommendations for improving federal and state accounting of the results of coastal management programs in achieving national policy objectives.

The Congressional declaration of national policy related to protection of beaches, dunes, bluffs and rocky shores includes:

"(A) the protection of natural resources, including ...beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat, within the coastal zone.

(B) the management of coastal development to minimize loss of life and property caused by improper development in flood-prone areas and in areas likely to be affected by or vulnerable to sea level rise, land subsidence, and saltwater intrusion, and by the destruction of natural protective features such as beaches, dunes, wetlands and barrier islands."

(Section 303 of the Federal Coastal Zone Management Act of 1972)

All coastal states with federally-approved coastal programs have adopted policies which interpret and implement the national policy objectives and call for the protection of natural resources and minimization of loss of life and property along the coast.

State coastal programs were designed to balance resource protection and development. The economic development pressures along the oceanfront and shoreline are tremendous. Shorefront property is scarce and highly valued. As a result, policies to protect natural resources are tempered by policies which meet other objectives. The most obvious conflicts involve balancing protection of the natural beachfront and bluff-front shoreline resources and processes (erosion and accretion) against protection of (a) existing development built too close to the water's edge and threatened by coastal erosion; (b) private property owners' rights to develop on their coastal lands; and (c) public access and recreational use of beach and dune areas.

This report covers the *background and context* for resource protection; the *research methodology*; *research findings and conclusions*; and *recommendations*.

## 2 BACKGROUND AND CONTEXT

State CZM programs which protect beaches, dunes, bluffs and rocky shores are each influenced by a variety of physical, social and economic context factors including: (a) the type and extent of the natural resources in a given state; (b) coastline erosion processes and storm events; (c) coastline ownership and development; (d) human interference with natural processes; (e) competing demands placed on natural coastal resources and state priorities for balancing these demands; (f) shared coastal management responsibilities between states, federal agencies and non-governmental organizations; and (g) the unique role of the CZM program in the state. Historic and cultural factors are also important in some states. See Table 1, for selected national context data by state. Also see Appendix A for data related to these national and state context factors.

### Beach and Dune, Bluff and Rocky Shore Resources

Beach resources are present along portions of all coastal state shorelines, though the length and character of such beaches vary considerably. Sandy beaches can be categorized into three distinct types: barrier beaches, mainland beaches, and pocket beaches. The Gulf of Mexico and Atlantic Coast is characterized by a system of *barrier beaches* and a relatively wide continental shelf, as is much of Alaska. Barrier beaches are part of a complex integrated system of beaches, marshes, bays, tidal flats, and inlets. These beaches are constantly migrating, eroding and building in response to natural processes and human activities. *Mainland* beaches stretch unbroken for many miles, some low standing and prone to flooding, others backed by steep headlands. They received sediment from nearby rivers and eroding bluffs. Examples include Long Island, northern New Jersey and southern California. *Pocket beaches* form in small bays surrounded by rocky cliffs or headlands. The headlands protect the sandy alcoves from erosion by winter storms and strong currents. Pocket beaches are common in Maine and the Pacific Northwest. Other coastline variations are based on plate tectonics or type of wave forces. Difference and variations in beach and dune coastline systems within a state, between states and within regions are factors affect states enactment and implementation of certain beachfront management tools.<sup>1</sup>

Headland/rocky shorelines and bluffs/cliffs are present along the West Coast, the North East Coast, the Great Lakes Coast, and Territorial shores. These features are absent along the low elevation Southern and South Atlantic coastlines. The underlying geology of active tectonics, faulting and earthquakes or glaciers, ice gouging and rafting, or ice and strong wind determine shore stability and erosion factors which effect state management responses.<sup>2</sup> Eroding bluffs and cliffs of the Great Lakes states, creating beaches and dunes, are subject to highwater levels which, when driven by storm winds and waves cause flooding and lakefront deterioration.<sup>3</sup>

Table 1 provides the length of the US coastline, using NOAA, U.S. Department of Commerce data, that includes two measures, one of direct oceanfront miles where they cross bays and sounds and the other tidal shoreline miles which extend inland to the head of tidewaters or to a point where tidal waters narrow to a width of 100 feet. The national shoreline, as measured by the US Army Corps of Engineers, to the head of tidewaters, or to the point where tidal waters narrow to 100 feet is also shown. Percent of direct ocean coastline in beaches, rocky shores and bluffs is also indicated from state CZM program estimates. For 8 of the 29 coastal states, their entire ocean coastlines are sandy beaches with no rocky shores or bluffs. All other 21 coastal states have other beaches and rocky shores, backed by bluffs or sand dunes.

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<sup>1</sup>Beatley, Timothy, David J. Brower, and Anna k. Schwab. 1994. An Introduction to Coastal Zone Management

<sup>2</sup>Ibid.

<sup>3</sup>National Committee on Property Insurance. 1998. America's Vanishing Coastlines: A New Concern for the Voluntary and Residual Property Insurance Markets. p.23



## Human Interactions

### Coastline Ownership

State jurisdictional ownership of beaches usually begins at mean high water and extends seaward. This leaves extensive dry sanding beach and dune systems in private ownership, except where governments have acquired beachfronts for recreation or preservation. Seventy percent of our nation's shoreline is in private ownership (excluding Alaska where 99% is publicly owned). As of 1970, three-fifths of the shoreline was undeveloped (excluding Alaska).<sup>4</sup> Development pressures vary depending on geography and climate issues. Inaccessible and hard to develop shorelines, such as rocky shores, are less prone to development than accessible sandy beach areas. A state's beach and dune management varies depending on the extent of public ownership. For the 20 coastal states (not including the islands or the Great Lake States), public ownership ranges from a high of 99% for Alaska to a low of 3% for Maine. For 11 of the 20 states, over 1/4 of the shoreline is in public ownership. (see Table 1).

### Coastline Development, Population Growth, and Economic Pressures on Shoreline Properties

As early as the late 1800s, recreational tourism began along our nation's beaches. With the advent of the automobile, seasonal seaside resorts evolved. The summer homes and fishing villages of the 1940s and 1950s were transformed by the 1970s into "cities on the beach."<sup>5</sup> Today, due to population and economic pressures, over half of our nation's population lives within 50 miles of the coast and our nation's coastal zone is over four times more densely populated than the national average.<sup>6</sup> In addition to the retirees who migrated to the coast and other year round residents, tourists and conventioners are demanding beachfront coastal resorts. This is most pronounced along our coastal barriers at high risk due to coastal flooding, hurricanes and erosion. Billions of dollars in private development and public recreation and infrastructure is invested on these unstable coastal barriers.<sup>7</sup> The demand for coastal waterfront property has lead to increased residential development pressures along our nation's coastal bluffs and rocky shores.

The persistent development along our nation's coastline had lead to destruction of coastal dunes systems and placement of structures in jeopardy from both short and long-term erosion. Shoreline development prior to the 1970s were frequently armored with seawalls, revetments, bulkheads or other shoreline stabilization structure to protect upland private and public investments from erosion. Such stabilization structures accelerated the loss of sandy beaches.<sup>8</sup> Table 1 shows coastal county population change between 1970 and 1990. For 17 of the 29 CZM states, population growth was over 30% (major impact); for 4 population growth was between 10 and 29% (moderate impact); and for 8 population growth was 0% to 9% (minimal impact.)

The cost of purchasing oceanfront and waterfront properties along our nation's shorelines are considerably higher than for non-waterfront properties. Likewise, the value of such properties have increased at a faster rate. The seasonal beachfront cottages of yesterday have given way to much larger and more expensive developments, often high-rise multi-family condominiums. The result is intensive, extensive and expensive investments in known coastal high hazard areas. Barrier islands have become a magnet for retirees and vacation homes.<sup>9</sup> About half of all residential and non-residential construction in the U.S. between 1970 and 1989 occurred in coastal areas. The most dramatic growth has occurred in the Florida and California.<sup>10</sup> Despite the environmental degradation associated with population growth, these shoreline areas remain in strong demand for commercial, residential, tourism and recreation.

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<sup>4</sup>Ibid.

<sup>5</sup>Platt, Rutherford H. et al. 1987. Cities on the Beaches; Management Issues of Developed Coastal Islands.

<sup>6</sup>U. S. Department of Commerce, NOAA. 1990. 50 Years of Population Change along the Nation's Coasts: 1960-2010.

<sup>7</sup>Platt, Rutherford, et al. 1992. Coastal Erosion: Has Retreat Sounded?, p.12.

<sup>8</sup>Ibid., p.8

<sup>9</sup>U. S. Department of Commerce, NOAA, NOS. 1992. Building Along America's Coasts: 20 Years of Building Permits, 1970-1989. p.5

<sup>10</sup>Ibid

## **Coastline Erosion**

Coastal erosion, the landward displacement of the shoreline, is a normal process that has been going on for many years along most of our nation's sandy beaches. Gradual long-term erosion from normal wave action (of 1-3 feet per year) is accelerated by severe storm events during hurricanes and winter storms, sea level rise, the greenhouse effect; and man-made shoreline stabilizations.<sup>11</sup>

The only nationwide survey of shoreline erosion, published by the U.S. Army Corps of Engineers in 1971, estimates that at least 7% of our nation's coastline is critically eroding where properties are in imminent danger of collapse and 25% is experiencing significant erosion.<sup>12</sup> In addition to long-term erosion, many coastal states have experienced shoreline loss and property destruction through periodic storm events. Bluff recession is also a problem along the Great Lakes States.

The average rate of erosion is determined locally through historical shoreline records or shoreline modeling. A few examples of documented shoreline retreat dramatize the management urgency of coastal erosion. Cape Shoalwater, Washington has been eroding at the rate of more than 100 feet a year since the turn of the century. It's sparsely settled sand dunes have retreated an outstanding 12,000 feet, or more than 2 miles since 1910.<sup>13</sup> Most of the barrier islands along the east and gulf coasts are retreating landward by 1 to 10 feet per year--rates of up to 20 feet are not uncommon for specific locations.<sup>14</sup> Every coastal state is affected by shoreline change and erosion.<sup>15</sup> Table 1 shows, by state, the amount of coastal shoreline threatened by critical erosion.

Sea level rise and land subsidence, as a contributor to shoreline erosion, are recognized problems along portions of our nation's coastline. If accurate, the long-term costs to protect existing development, shoreline stabilizations, and infrastructure would be staggering<sup>16</sup>

## **Coastal Storm Events**

Coastal storms and hurricanes exacerbate long-term erosion, shifting the position of beaches and sand dunes and splintering and collapsing erodible bluffs. Rapid shoreline erosion caused by high storm surge and wave heights overtop dunes and damage beachfront buildings in harm's way. Wave attack at the base of steep slopes, undercut and collapse overhanging banks and topple properties perched on such bluffs. Large tsunamis waves with speed and height have inflicted great damage to California and Hawaii coastal areas. Between 1980 and 1995, 11 separate billion-dollar weather disasters struck coastal areas of the US: 9 hurricanes, 1 Nor'easter and 1 tropical storm resulted in over \$46 billion in damages.<sup>17</sup>

## **Human-Interference with Natural Processes**

Beach systems, and sandy beaches in particular, are dynamic. They advance and retreat, but over several cycles maintain state of equilibrium. Beginning as early as the 1890s, a variety of human modifications to the physical shoreline have been undertaken to achieve objectives that run counter to the protection and dynamic equilibrium of natural beach/dune systems. This host of human interferences have adversely affected the natural sand transport system, destroyed or caused dune instability, and increased erosion. These include the damming of coastal rivers; dredged navigational channels with jetties for shipping and dredged tidal inlets for commercial fishing and recreational boating; the placement of dredged spoil and beach quality sand offshore

<sup>11</sup>Kaufman, W., and O.H. Pilkey, Jr. 1983. The Beaches are Moving.

<sup>12</sup>U.S. Army Corps of Engineers. 1971. National Shoreline Study.

<sup>13</sup>National Committee on Property Insurance. 1988.

<sup>14</sup>Ibid

<sup>15</sup>U.S. Army Corps of Engineers. 1971.

<sup>16</sup>S.D. Lyles, L.E. Hickman., and H.A. Debaugh. 1988. Sea Level Variations for the United States, 1855-1986. US Department of Commerce, National Oceanic and Atmospheric Administration, Rockville, Maryland.

<sup>17</sup>U.S. Department of Commerce, NOAA, NCDC. Home Page <http://ncdc.noaa.gov/publications/billionz.html>

beyond the littoral sand transfer system; shoreline armoring; sand-trapping structures such as groins and breakwaters; sand mining for development; and sand scraping practices. Efforts to recreate natural beach/dune systems include sand fencing and dune revegetation, beach nourishment, and inlet sand transfer.<sup>18</sup>

The *damming of coastal rivers*, to protect urban areas downstream from flooding and provide hydro-electric power, has trapped sediment that would normally feed coastal beaches. Sediment starved beaches occur most on the west coast, but some east coast beaches are also affected by river diversions. *Inlet dredging* to maintain established boating and shipping access through coastal barrier passes that open and close with storm events has, until recently involved disposal of dredge material offshore beyond the littoral sand transfer system. The loss of this sand to the nearby beaches has increased erosion. For major navigational channels, the installation of *jetties* to stabilize the such inlets results in trapping sand on the updrift side of the inlet and starving the downdrift beaches. *Offshore breakwaters* used primarily to stop wave action and create a quiet water area for safe boat moorings obstruct the free flow of sand along the coast and starve downstream beaches.

*Shoreline armoring* through placement of seawalls, revetments, bulkheads, or riprap to protect private oceanfront structures and public infrastructure from erosion has occurred at the expense of lost recreational beaches. These wave-resistant walls may withstand wave action and protect upland properties but rapidly remove sand from the beach and eventually fail or require more substantial armoring.<sup>19</sup> *Groins*, structures extending into the water to interrupt and accumulate sand on the updrift shore, also starves downdrift adjacent beaches. Most of our nation's urban oceanfronts have been armored, although the percent of our nation's beachfront/oceanfronts that has been armored is unknown.

*Sand mining*, the removal of sand from beaches, dunes, adjacent areas, or riverbeds near was common practice in many states for road construction and development fill. This resulted in a loss of sand and protective dune areas, making such areas vulnerable to coastal flooding from storm events and accelerating erosion. *Sand scraping*, the practice of moving sand accumulated at one portion of the beach to another to build back a dune or the practice of leveling sand in front of a beachfront development to provide visual access to the water, has been allowed in many states. The negative effects include unstable dunes and low-lying dune areas vulnerable to breaching in storms.

Three activities have been used to try to recreate the natural beach/dune system. Dune restoration through *Sand fences and dune revegetation* has been used to stabilize and re-build dune areas. This helps limit breaching and creation of new inlets during major storms. *Beach renourishment and period nourishment* has become a popular alternative to armoring, in attempting to artificially create or recreate a beach area through the importing of compatible sand and pumping/placing it on the eroded beach area. The flattened beach profile and wider beach width mitigates erosion losses and storm-induced inundation. In certain high erosion areas, however, sand is rapidly washed away. Finding suitable sand source borrow areas also poses challenges. *Sand transfer facilities* which pump sand from updrift accumulation areas to downdrift beaches has ameliorated this problem. In Florida, for example, over 80% of the beach erosion on the state's Atlantic coast is estimated to be caused by 19 maintained inlets, most stabilized with jetties.

#### **Balancing Competing Demands for Protection of Natural Resources with the Use of Hard Structures to Protect Private Oceanfront Properties and Public Infrastructure**

Sandy beaches backed by dunes or bluffs, rocky shores and wetlands constitute the three types of natural shoreline features along our nation's coastline. The natural resource protection values of these features are often in conflict with social and economic values as reflected in shoreline use and development. State CZM programs were created, in part, to provide institutional mechanisms and management tools to balance the competing demands placed on these shoreline features.

The natural resource protection values of beaches and dunes commonly identified by state coastal programs include the first line of defense and protection of upland properties from storms and high tides; and wildlife

<sup>18</sup> US Army Corps of Engineers. 1971 and Platt. 1992.

<sup>19</sup>U.S. Army Corps of Engineers. 1971. Shore Protection Guidelines. pp32-33

habitat for marine life such as sea turtle nesting areas, bird nesting and staging areas, and endangered species habitat. Key use values of beaches and dunes are recreation, tourism and access to coastal waters. On the flip side of the coin, social and economic demands have also made oceanfront properties highly desired places for second-homes, resorts and year-round residences. Beachfront and bluff-front development built too close to the edge and now in jeopardy has led to shoreline armoring which has destroyed the natural beach/dune systems which attracted people to the coast in the first place. In addition, cutting and maintaining of inlets for recreational and commercial navigation has permanently disrupted the natural transport of sand along the beachfront, accelerating the loss of recreational beaches.

Coastal bluffs, sitting behind extensive or minimal beaches, have been thought of as excellent features for providing coastline vistas. In a few states, select bluff areas have been acquired and managed as natural resource protection areas or scenic vista areas. Most are managed as high erosion areas where development and other activities are regulated to minimize erosion risks rather than protect valuable natural resource features. The social and economic pressures for ocean vista developments have resulted in the siting of development along bluff recession areas in harms way.

Rocky shores, located within the inter-tidal zone, are recognized as high energy environments and valuable marine habitat. The inter-tidal areas are under state ownership and management. Although public access and recreational enjoyment of these areas has not been restricted, states are beginning to limit public access to avoid over-utilization and destruction of tide pool areas. Rocky shoreland areas have for the most part been resistant to erosion and therefore not managed as high hazard areas. Likewise, they have not been considered developable, though development often occurs immediately landward of these features.

Balancing such competing demands has become a key role of state CZM programs (see below). As our understanding of the impact (both individual and cumulative) of human activities on natural systems grows, coastal managers are looking for alternative management approaches to allow activities but minimize their negative impacts on resources of known public benefit. The U.S. is based on strong private property rights laws. The private property takings issue in the regulation of coastal land and water uses is of paramount importance in the development and implementation of coastal management tools. Over the years, states priorities in balancing resource protection and development have varied and altered. Today, coastal programs are required to justify their management decisions basing complex technical data sets. Refinements to shoreline setbacks, based on historical erosion rates, demands sophisticated and complex computer modeling programs.

Government has invested billions in public infrastructure along our nation's coastlines from highways and bridges to water and sewer systems to support mainly private development and some public facilities including military facilities, coast guard stations, hospitals schools and recreation facilities. Beginning in the 1980s, in recognition of the hazardous nature of barrier islands, federal and state agencies have begun to limit their public investments in such areas.

## **Shared Coastal Management**

Several federal agencies have a long history of involvement with our nation's coastlines, all pre-dating the Federal CZM Act of 1972. Key federal players involved in activities affecting beaches, dunes, bluffs and rocky shores include the U.S Army Corps of Engineers, the Federal Emergency Management Agency, the U.S. Department of Interior/National Park Service/US Fish and Wildlife Service. Starting in 1972, the U.S. Department of Commerce/Office of Ocean and Coastal Resource Management became responsible for administering the Federal CZM Act.

**The Army Corps of Engineers (COE)** administers the 1) federal shoreline protection program through research, planning, design, construction management, federal cost-sharing; 2) authorized navigation channel dredging; and 3) federal permits for dredge and fill involving any construction or other activity which affects navigable waters including federal guidelines for beach nourishment and shoreline stabilizations. The COE Published the National Shoreline Study in 1971, and is working on analysis of Federal shore protection program for Congress.

The COE shoreline protection program covers construction projects for hurricane and storm damage reduction, beach erosion control, navigation, mitigation and recreation. Since 1930, Congress has authorized 137 projects or studies involving 19 of the 29 CZMA states plus 4 coastal states not in the CZM program. A total of 82 Federally-sponsored shore protection projects were constructed between 1950 and 1993 in areas of concentrated development experiencing severe erosion and/or property damage from storms. The projects protect 226 miles or less than 0.3 % of the 84,240 mile of tidal shoreline of the U.S. and only 8% of the 2,700 miles of COE identified "critical-erosion" coastline.<sup>20</sup> Of the 82 projects, 56 were large projects costing \$1,177.3 million in 1993 dollars. The cost-sharing was 60% federal and 40% non-federal (state, locals, and private) sponsors.<sup>21</sup> These projects involve one or more of the following: 1) initial beach restoration, sometimes with dune filling; 2) periodic beach nourishment; 3) shoreline structures-groins, seawalls, revetments, breakwaters, bulkheads, or sand transfer plants; 4) emergency measures to repairs storm damaged projects. The significant shift from reliance on fixed structures in the 1950s to beach restoration and periodic nourishment in the 1970s by the COE, is based on a realization that fixed structures protect upland property but destroy recreational beaches. Artificial beaches as a primary means of shore protection has become a major component of the COE program. the concept of replicating the protective characteristics of natural beach and dune systems. However, beach renourishment is not without its critics. In 1983, 1 million square yards of sand placed on the beaches of Ocean City, New Jersey at a cost of \$5.5 million. Within a few years, storms removed and redistributed much of the sand. <sup>22</sup> In 1993, the COE initiated an investigation and analysis of the benefits, environmental effects, and the existence of induced development resulting from Federal shore protection program. <sup>23</sup> The small percent of our nation's coastal erosion problem covered by the COE, leaves state CZM program with major responsibilities to cope with and address appropriate erosion responses. See Table 3 in Appendix A for shoreline protection projects by state between 1950-1993.

The COE navigation channel dredging program began with the Harbors Act of 1890. Since then Congress has authorized 830 navigation projects for channels for shipping, commercial fishing and recreational boating involving every coastal state, territory and commonwealth.<sup>24</sup>

The COE permit program for dredge and fill projects in navigable waters is subject to federal consistency provisions. Only one coastal state, Alaska, relies on the minimum standards contained in the COE regulations for placement of shoreline stabilizations. All other coastal states have their own state regulatory programs covering shoreline stabilizations and other activities over coastal waters.

**The Federal Emergency Management Agency (FEMA)** administers the Federal Flood Insurance Program that produces rate insurance maps and insures properties within the 100-year flood zone for local community participating in the program. Insured coastal structures, when damaged or destroyed, receive insurance claim payments to repair or rebuild. Critics have argued that, despite local code requirements, the NFIP promotes subsidized inappropriate development in coastal high hazard areas, impeding state management efforts to restrict new development and redevelopment in these areas.

In 1994, Congress required FEMA to conduct an evaluation of the economic impact of mapping coastal erosion areas and then denying flood insurance for existing and new structures in such areas, establishing actuarial rates, and changes in the tax base of communities.<sup>25</sup> As of 1992, there were over 66,000 NFIP policies in effect covering structures in the hazard zone (V-Zone).

Under the Upton/Jones Program 1988-1995, FEMA allowed for payment of flood insurance claims to demolish or relocate buildings imminently threatened by erosion. A total of 434 claims have been approved under this program. 73% for demolition. (See Table 4 in Appendix A for claims by state). FEMA is currently conducting an evaluation of economic impact of mapping erosion hazard areas for Congress.

<sup>20</sup> U.S. Army Corps of Engineers. 1971.

<sup>21</sup> U.S. Army Corps of Engineers. 1994. Shoreline Protection and Beach Erosion Control Study: Phase I: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers.

<sup>22</sup> Nordstrom, Pilkey et al. 1986. Living with the New Jersey Shore. Durham, N.C. Duke University Press.

<sup>23</sup> U.S. Army Corps of Engineers. 1995. Shore Protection and Beach Erosion Control Study: Economic Effects of Induced Development in Corps-Protected Beachfront Communities.

<sup>24</sup> U.S. Army Corps of Engineers, Institute of Water Resources, Table D, Unpublished Report.

<sup>25</sup> FEMA. Undated. "Section 577 of the National Flood Insurance Reform Act of 1994—"Evaluation of Erosion Hazards": Overview of Study Plan." (provided by Mark Crowell, FEMA)



**U.S. Department of Interior (DOI), National Parks Service (NPS)** created and manages 10 National Seashores covering 592,627 acres and 4 National Lakeshores covering 228,716 acres. **The DOI U.S. Fish and Wildlife Service (USFWS)** enforces federal wildlife and endangered species laws and maintains system of national wildlife refuges. In cooperation with states and local communities, USFWS identifies and protects beach and dune areas which provide nesting sites for endangered sea turtles and birds through limitations on sand fencing and beach nourishment during nesting season. Rocky shores, habitat for the Steller Sea Lion and other endangered mammals. There are several National Wildlife Refuges along our nation's coastline. These national wildlife refuges are managed by USFWS to preserve the natural beach/dune systems.

DOI/USFWS also administers the Coastal Barrier Resources Act of 1982 and Coastal Barrier Improvement Act of 1990. The purpose of the Act is to minimize loss of human life, wasteful Federal expenditures, and damage to fish, wildlife and associated natural resources. The Act restricts federal expenditures and financial assistance that have the effect of encouraging development on designated coastal barriers along the Atlantic, Gulf and Great Lakes shorelines. This includes prohibitions on National Flood Insurance, HUD assistance, public infrastructure, and other financial assistance. The system includes 582 units, comprising over 1.3 million acres and 1,276 miles of shoreline that are not publicly owned or otherwise protected. An additional 173 units of otherwise protected areas are covered under the 1990 Act which includes public barrier holdings in federal, state and local ownership. These areas include national wildlife refuges, national parks and seashores, state and local parks and conservation lands. (See Table 5 in Appendix A)

**The U.S. Department of Defense** owns coastal properties within military bases, some significant tracts along the eroding coastline. The closing of certain bases and disposal of coastal properties will pose choices between sale for development or transfer for public preservation.<sup>26</sup>

Nonprofit conservation organizations have played a significant role in preserving certain coastal barrier lands. **The Nature Conservancy, the National Audubon Society and the Trust for Public Lands** and their partners have selectively acquired parcels for protection. Just over half of the shoreline of coastal barriers on the Atlantic and Gulf of Mexico are protected through public or quasi-public ownership.<sup>27</sup>

#### Unique Role of States CZM Programs

All coastal states are involved with the protection of their natural resources through a variety of state and local management controls. 29 of the 35 coastal states, territories and commonwealths have federally-approved CZM programs. The management tools these states utilize to protect beaches, dunes, bluffs and rocky shore include regulatory, planning, direct land management, acquisition and other techniques. These tools are discussed in detail in this study. In most states, local governments participate through local land use controls. The unique role of state CZM programs has been the creation of unified state programs which articulate the conflicts among competing uses, the policies of the state and the balance or method used to resolve conflicts; and utilizes land use controls, both state and local, to manage shoreline uses.

State CZM programs have become increasingly involved in identifying the problems of eroding beach/dune systems and developing coordinated responses through statewide beach management and erosion control plans. States concern about adverse effects on downdrift beaches from federal dredging of navigation channels, offshore disposal of dredged materials, and loss of recreational beaches from shoreline armoring, has lead states CZM programs to take a proactive role in shaping state and federal policies and programs. In recognition of the adverse effects on recreational beaches from shoreline armoring. For example, the South Carolina CZM Program pushed for Congressional recognition that COE dredging of Charleston Harbor was causing severe beach erosion on the sand-starved downdrift beaches and led to the Folly Beach renourishment mitigation project.<sup>28</sup> The State of Florida passed legislation requiring that suitable beach quality sand from be inlet and navigational channel dredging be placed on the down-drift beaches and used federal consistency and state-funds to negotiate with the COE to place 1.4 million cubic yards of sand from St.

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<sup>26</sup>Platt. 1992.

<sup>27</sup>Ibid.

<sup>28</sup>U.S. Army Corps of Engineers. Water Resources Development in South Carolina. 1993. p.44

Mary's inlet dredging on the down-drift beaches rather than losing the sand to the offshore system.<sup>29</sup> Several states have passed legislation limiting the use of new shoreline stabilizations, in an effort to protect beach and dune systems at the expense of private upland properties.

The inappropriate siting of structures on coastal barriers, in coastal flood zones and on erodable bluffs is a problem which state CZM programs inherited. Thus when the state CZM programs began in the 1970s, certain portions of our nation's coastline were already committed to intense development and other areas already zoned and platted for development. Shoreline erosion was a recognized problem, but land use controls were not well developed. State CZM programs would provide the testing grounds for land and water management to balance competing demands along our shoreline and minimize adverse impacts on valued natural coastal resources. State CZM programs would be at the forefront of the "quiet revolution in land use controls" and "integrated coastal management."

**State Profiles**, developed as part of this study, capture some of the complexity and diversity of geographic, geologic, and social context factors which are unique to each coastal state and its CZM program. The authors found no significant correlation between these factors and management tools employed by a group of states. These context factors have proven helpful, however, in understanding the unique set of conditions in states that influence coastal management program actions. For example, the Connecticut, New Jersey and portions of the New York coastlines were *already intensely developed* at time of program approval, so population growth between 1970 and 1990 was not a major concern. In Connecticut, management attention has therefore focused on coastal erosion-based permits for improvements and additions to existing structures and development on the few remaining lots within the coastal erosion zone. In New York and New Jersey, attention has been given urban waterfront redevelopment and erosion response to protect existing structures. The islands of Guam, Northern Mariana Islands, Virgin Islands, and American Samoa have each experienced *significant population growth* (>50%) between 1970 and 1990. Tourism development on these islands has placed pressures on the natural resources and infrastructure. Continued development along the narrow low-lying coastal plains has exacerbated coastal hazard risks on these already storm-vulnerable islands. Agricultural use and some new develop on steep slope areas is causing landslides and soil erosion. At least eight states are experiencing *critical erosion* along more than 10% of their shoreline. All but a few states have areas where existing coastline development is falling into the water or in imminent danger of collapse as a result of being constructed too close to an eroding beach or receding coastal bluff. The management responses to shoreline erosion, both on beaches and bluffs, vary by state—from setbacks to requiring moveable structures, to prohibiting shoreline stabilization structures—but each state with such erosion has sought management solutions. Although all states have beach resources, the demand and utilization varies. Alaska and Florida have extensive *barrier beach resources*. The *warm sub-tropical climate* places Florida's beaches in high demand for recreation and development, while the *bleak Arctic climate* of Alaska along with extensive public holdings makes beachfront development a non-issue. Oregon and Maine have *rocky shore resources* of high scenic value. *Easy linear access* along the Oregon coast has made protection of rocky intertidal areas from over-use a significant issue. In contrast, the *irregular and inaccessible* nature of the Maine coastline reduces the need for protection measures. Several states have coastal bluff resources, but *bluff erosion and bluff development pressures* vary. Where new development along unstable bluffs is occurring—such as PA, OR, CA, MI—a variety of management responses are being developed. American Samoa, Guam, Hawaii, and Northern Mariana Islands have *historic and traditional cultural values* which affect coastal management. In American Samoa, most properties are owned by the aigas (communal villages) with tribal chieftains making decisions about communal use of the land consistent with traditional cultural values.

### **National Perspective**

Context factors are helpful when evaluating the overall national effectiveness of state CZM Programs. For example, the length of coastline and type and extent of natural coastline features highlight the relevant areas needing coastal management attention; the extent and change in coastal erosion along our nation's shoreline help define the magnitude of erosion as a national coastal management problem; the extent of public versus private ownership of the coastline puts the relevancy of various management tools (direct land management,

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<sup>29</sup>State of Florida. Florida Coastal Management Program. Best Projects Report. 1988. p.19

regulatory controls and land acquisition) into perspective, and the population and economic pressures along the coastline bring into focus the competition between resource protection and development interests.

### **Issue Identification**

All but three of the twenty-nine coastal states identified issues associated with protection of natural coastal resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue for their program. Two states ranked the issue of moderate importance: Connecticut has no open-ocean coastline and was already intensely developed at time of program approval; Wisconsin considers wetlands protection a higher priority. Louisiana ranked the issue as low, since only a small portion of the coastline is sandy beach and wetlands are the highest priority issue. (See Table 1)

### **Diversity of State Policy Objectives**

The tools states employ reflect each state's policy priorities to address competing uses along our nation's beachfront and shoreline areas. This study focuses on a cross-state analysis of the key tools, selected provisions, and on-the-ground outcomes of tools employed. It should be noted that the policy intent behind the tools employed vary, even among similar types of tools employed. Figure 1 illustrates the diversity of policies behind state setback regulations.

### **Overview of State CZM Programs**

This study covers the twenty-nine coastal states, territories and commonwealths with federally-approved coastal zone management programs as of 1995. For the purpose of simplicity, all twenty-nine programs are hereinafter referred to as "coastal states," which term is intended to include states, territories and commonwealths. The state coastal programs were approved between 1976 and 1988. (See Appendix C)

Each of the twenty-nine coastal states was required to develop and describe its program in a CZM Plan and a draft and final Environmental Impact Statement (EIS), prior to program approval. These documents contain some baseline data on resources. They also describe the key tools to be employed in the program to address resource protection and other issues.

Under the CZMA (Section 306(d)(11); 15 CRF, Section 923.42-.44), states were required to develop coastal programs with means for controlling coastal land and water uses in one or more of three ways: Technique A- state establishment of criteria and standards for local implementation; Technique B- direct state land and water use planning and regulation; or Technique C- state review on a case-by-case basis of actions affecting land and water uses subject to the management program. Ten of the states developed programs based on direct state land and water use planning and regulatory programs (Technique B). Nineteen of the states used a combination of state controls and local controls based on state standards. (See Appendix C)

Looking at primary authorities and tools employed by state CZM Programs to protect beaches, dunes, bluffs and rocky shore resources, twelve states employ state-level regulatory programs; seventeen states employ a combination of direct state and local planning and regulatory programs. Although all states own coastal properties, for three states ownership and direct land management is a primary tool. (See Appendix C)

Most coastal states are finding ways to provide for local participation in coastal management decisions. Even states that do not rely on local controls as part of their approved programs are providing for voluntary or mandatory local participation. For example, in 1995 New Hampshire began requiring local shoreland ordinances and setbacks. In 1994, Florida added local comprehensive planning to its tool box. In 1990, South Carolina began requiring local beach management plans tied to access and beach nourishment funding.

Coastal states use a wide variety of management tools to protect beaches, dunes, bluffs and rocky shores. Coastal management tools are continually evolving. Twenty-seven of the twenty-nine coastal states have made **significant changes** to their program tools in ways that affect protection of beaches, dunes, bluffs and rocky shore resources. (See Figure 2 below and Appendix C) The fact that state coastal programs are changing

complicates efforts to assess program effectiveness looking at on-the-ground results of program implementation. Although not the methodological approach taken in this study, a review of changes which strengthen or weaken protection programs could be used as a way to assess CZM program effectiveness.

Figure 1: Diversity of policies behind state coastal setback regulations

Commonwealth of Northern Marianas	Preserve visual open space.
Virgin Islands, Guam	Retain public access.
Puerto Rico	Retain public access and prevent shadows on the beach.
Hawaii	Protect shoreline resources vital to the economy and environment, protect natural shoreline processes, provide public access.
Maine	Conserve wildlife habitats and other vital resources, protect natural functions of frontal dunes.
Michigan and Pennsylvania	Keep development away from bluff-recession hazard areas. Both address reasonable use of parcels subdivided prior to setback laws. Michigan allows moveable structures and Pennsylvania uses a variances process.
Oregon	Protect public access, protect life and property from hazards including ocean flooding, to prohibit development on beaches, active foredunes, and other conditionally stable foredunes and intertidal dunes.
Rhode Island	Multiple setbacks: to protect foredunes, coastal features - beaches, dunes, bluffs, rocky shores; to reduce loss of life and property in designated coastal hazard areas; to reduce public expenditures for infrastructure and flood disaster relief on barrier islands.
South Carolina	Preserve beaches and keep development off the active beach and dune. However, as a result of taking cases, the state allows certain development along the oceanfront if not located on primary dune.
American Samoa, Florida, New Jersey Carolina, other states	Consider the type and/or size of development (single North family, commercial and/or square footage/number of units) in setting development back from the shoreline.
several states	Erosion-rate based setbacks to respond to beach dynamics and to keep development out of coastal erosion areas.
most states	Variance provisions to avoid "taking" issues associated with private property rights.
Source: State CZM Profiles.	

Figure 2: Examples of **significant changes** to State CZM program tools which affect protection of beaches, dunes, bluffs, and rocky shores:

- \* California adopted coastal hazard landform alteration policy guidance in 1993 to address geologic stability of bluff top development.
- \* Connecticut amended its regulatory program in 1987 to include permits for seawalls which had previously been exempt from review.
- \* Florida amended its beachfront regulatory program in 1985 to establish a 30-year erosion zone and prohibit major development seaward of that zone line.
- \* Hawaii amended its setback provisions in 1989 to limit variances and improve enforcement of setbacks and variances.
- \* Maine amended its sand dune rule in 1989 and 1993 to broaden and clarify permit requirements for development on sand dunes. In 1995, Maine amended its natural resource protection act to allow existing seawalls and other shoreline stabilizations to be fortified and built bigger/stronger to protect existing threatened oceanfront development. This was contrary to the sand dune rule which promotes retreat from erosion-prone areas.
- \* Massachusetts passed a state endangered species act in 1990 which expanded beach management from flood control and storm damage protection to include protection of wildlife habitat and endangered species.
- \* Michigan amended its shorelands protection and management act in 1992 to expand the definition of bluff-line to cover non-bluff shoreline and extended the inland setback requirements to address severe short-term erosion events.
- \* New Hampshire revised the definition of the high water mark in 1995 extending more landward state permit jurisdiction.
- \* New Jersey amended its oceanfront permits program in 1988 and 1990 to expand its jurisdiction landward and include single family, commercial development and shoreline stabilizations previously excluded. Amendments also created erosion hazard areas and erosion-rate setbacks within these areas.
- \* North Carolina amended its program in 1985 to prohibit hard erosion control devices designed to harden or stabilize beaches, and modified its law in 1989 to allow stabilizations to protect historic structures.
- \* Oregon adopted a Territorial Sea Plan in 1994 which includes a Rocky Shores Strategy. Areas are inventoried, classified and designated under one of four classifications. Within these areas access/use is restricted.
- \* South Carolina amended its beach management act in 1988 and 1990. Since 1988, the state prohibits new shoreline stabilization structures; since 1990, reconstruction of shoreline stabilizations & rebuilding of certain damaged structures is restricted.
- \* The Virgin Islands adopted 18 Areas of Particular Concern in 1994 which include sea turtle nesting beaches for special protection.

Source: State CZM Profiles

### 3 METHODOLOGY

A detailed description of the methodology is provided in **Appendix B-1**. The following is a summary containing the research question, research design, and approach to determining effectiveness.

#### Research Question and What is Covered

The basic research question utilized is "how effective overall have the individual and collective state CZM program efforts been in addressing protection of beaches, dunes, bluffs and rocky shores?"

#### Research Design

The overall research framework is described in the introduction to the entire study. A specific survey instrument was developed for collecting process and outcome data on protection of beaches, dunes, bluffs and rocky shores. This survey instrument was sent to all twenty-nine CZM states. In addition, the instrument was used in completing follow-up phone interviews with state contacts. The survey results served as the basis for completion of individual state CZM profiles. (See **Appendix B-2** for a copy of the Survey Instrument)

In addition, the authors reviewed information from state CZM documents including Final Environmental Impact Statements (FEIS); 309 Assessment and Strategy Reports and state laws and regulations pertaining to resource protection. Where provided by OCRM or the coastal state, the authors reviewed documents on beach and dune protection, state coastal parks, land acquisitions, and selected state CZM progress reports, annual reports, and 312 evaluation reports.

Follow-up phone interviews and data requests were made to each coastal state, usually to multiple state agency or bureau staff. It was typical to contact more than one staff in the state CZM program office, the state land management agency, a state environmental regulatory agency, the state land acquisition agency, and the state wildlife protection agencies.

#### Determination of Effectiveness

"Coastal Management Tools" are the processes, tools, and techniques a state coastal management program employs or utilizes to address a coastal management issue and to implement its program.

"Process Indicators" are the specific management programs, tools or techniques that states have developed to address coastal problems. Examples include key provisions of regulatory programs such as coastal setbacks from primary dunes or control zones which protect natural functions of resources; plans with enforceable policies that address beach renourishment, inlet management, dune restoration or special area resource protection; state land management of coastal parks which guide access or protect unique habitat areas; and acquisition programs to purchase beaches, dunes, bluffs or rocky shore areas.

"Outcome Indicators" are the specific on-the-ground measurable effects that result from implementation of CZM programs, tools, and techniques. Examples include linear and/or area data on permits issued reflected in miles of beachfront shoreline developed or armored through permitting; area restricted from vehicular access through access plan and regulations; miles and/or acres of coastal shoreline in state land management or protection status; miles and cubic yards of beaches restored or dunes revegetated; miles and/or acres of coastal shoreline acquired for resource protection.

"CZM Program Effectiveness" means the special role of CZM in using process tools to affect outcomes sought under the CZMA, namely the protection of natural beaches, dunes, bluffs and rocky shores. Effectiveness is measured by: 1) process indicators (tools) and outcome indicators (results) and their linkage within each of the 29 state programs; 2) state CZM program implementation through case examples where no statewide data is

available; and 3) the unique role of CZM as only one of many government and non-government agencies involved in coastal management.

### **Research Limitations**

There are several limitations to this research project. The greatest limitation involves a lack of historical information and databases on state CZM management tools and outcomes. The following is a list of some of the problems and weaknesses which limit meaningful cross-state comparisons of CZM tools and results, and the assessment of CZM effectiveness:

- (1) diversity among state CZM programs with regard to natural resources, size, region, coastal population, development, priorities for balancing resource protection and development, organizational and management framework, and application of similar management tools;
- (2) multiple state agencies involved in the coastal area with separate management mandates, and a lack of coordination among agency programs to achieve common objectives;
- (3) lack of database at OCRM on state CZM program tools, activities, outcomes including a lack of standardized and consolidated reporting in performance evaluations, grants, annual reports which is reflected in an inadequate reporting process between the coastal states and OCRM; inadequate computerized permit tracking data regarding miles, acres, resources, areas affected, length of projects permitted, and assessment of cumulative impacts of multiple permits; and lack of federal standards for measuring state CZM performance coupled with a lack of measurable data provided by OCRM and the coastal states;
- (4) lack of documentation, bibliographies and dissemination of CZM technical reports and program results;
- (5) reliance on case examples and success stories, in the absence of statewide data on CZM outcomes, as indicated in biennial reports to Congress and state submissions to OCRM;
- (6) significant changes to state CZM programs over the years which are not documented by OCRM;
- (7) turn-over among state CZM staff and the lack of institutional memory about CZM activities and results;
- (8) compounding factors which influence and shape state coastal policies and programs and affect CZM results including economic development, environmental pressures, political and social factors.

## 4 RESULTS

**NATIONAL OBJECTIVE OF PROTECTING COASTAL RESOURCES IS BEING ACHIEVED** through implementation of federally-approved state coastal management programs. State CZM programs efforts are effective overall in addressing protection of beaches, dunes, bluffs and rocky shores, given that CZM requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline. Determination of CMP effectiveness has been based on process and outcome indicators and case examples. There was insufficient outcome data to determine on-the-ground results of program implementation.

### **TOOLS EMPLOYED BY COASTAL STATES TO PROTECT BEACHES, DUNES, BLUFFS, AND ROCKY SHORES AS OF 1995.**

Coastal states are utilizing a wide variety of tools to achieve resource protection including regulatory, planning, state land management, acquisition, non-regulatory and research tools. A summary *list of the tools* each of the twenty-nine coastal states employ to protect beaches and dunes is shown in Table 2. Tools used to protect bluffs and rocky shores are shown in Table 3. As noted above, coastal management tools are continually evolving. The summary represent management tools in place as of the summer of 1995. All but three state coastal programs identified issues associated with protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. The primary authorities and tools utilized by coastal states are regulatory controls over land and water uses along the coast. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool. Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

All but two coastal states have made significant changes to their program tools in the way they protect resources. Significant changes have often included expansion of the geographic area or types of activities covered by shoreline setbacks or regulations and changes to limitations on shoreline stabilizations. Most give greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shoreline using structural measures. These changes complicate assessment of program effectiveness, using outcome indicators.

Regulatory tools are the most significant tools employed nationwide to protect shoreline resources, because the majority of the oceanfront shoreline is in private ownership and is subject to significant shoreline change and development pressures. The scope, policies, and provisions of state coastal regulatory programs afford greater natural resource protection. State coastal programs protect beaches, dunes, bluffs and rocky shores through setbacks, regulation of shoreline development and shoreline stabilizations, restrictions on pedestrian access, vehicular access, and habitat protection, and permit compliance/permit tracking systems. Most coastal states employ construction setbacks from the shoreline to provide a natural buffer between development and the water. Almost all coastal states regulate activities within defined coastal construction control areas in ways that minimize adverse impacts on the natural shoreline resources and protect critical habitat areas. Most coastal states regulate the use of shoreline stabilization structures to minimize adverse impacts on beach systems. Many coastal states restrict pedestrian and vehicular access along portions of the shoreline. Pedestrian access restrictions channel human encroachment along boardwalks or dune crossovers, minimizing dune destabilization and limiting adverse impacts on fragile shoreline resources. Vehicular access restrictions keep vehicles off sensitive coastal habitat areas or limit vehicular use to government vehicles or off-road vehicles in areas planned for their use. Almost all coastal state have permit compliance programs to enforce their regulations and permit tracking systems. Only a few coastal states prohibit shoreline stabilization structures, thereby placing protection of beach systems as a policy priority over protection of upland structures.

Planning tools, when combined with regulatory, are used effectively to protect natural resources. Most coastal states with beach or bluff resources employ some type of planning tool. Locally-delegated permitting combined with mandatory local planning in eight coastal states provides the key management tool in protecting beaches, dunes, bluffs and rocky shore resources. Planning programs are more effective when combined with



implementation through state regulation or local land use regulations, zoning and subdivision ordinances and other actions.

**Stewardship of coastal lands, through direct land management and acquisition, is an important component of all state coastal programs.** All coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore. Most coastal states have natural protection areas and guided accessways and many have acquired additional coastal land holdings. Almost half of the coastal states use boardwalks or dune crossovers to protect dune vegetation and minimize adverse impacts on natural resources and employ sand fencing and dune creation to restore the natural function of damaged dune systems. Over half of the coastal states use beach nourishment to recreate recreational beaches which are eroding away. Eleven coastal states have chosen to armor or repair existing shoreline stabilization structures in high erosion areas, primarily to protect coastal highways or other public infrastructure investments.

**Nonregulatory and research tools support regulatory, planning, acquisition and direct land management activities.** All coastal states employ some types of nonregulatory and research tools. For example, education and technical assistance to local governments function to improve local coastal planning and regulation. Likewise, research and technical reports on shoreline erosion rates function to improve state regulatory controls over development in erosion prone areas. Table 2 identifies the key nonregulatory and research tools that states use in shoreline management. No attempt was made to collect outcome data for these tools. Any further analysis of these tools was beyond the scope of this study.

#### **OUTCOME INDICATOR DATA**

There is insufficient nationally compatible outcome data to determine on-the-ground effectiveness of the national program. It is not possible to determine on-the-ground outcomes or effectiveness of implementing state CZM regulatory, planning, state land management, or acquisition programs to protect beaches, dunes, bluffs and rocky shores, based on the scarcity of data and information provided by OCRM and the coastal states. Monitoring and reporting of on-the-ground outcomes of CZM program activities have not been required, as part of OCRM's annual reporting on grants and activities and the periodic 312 program evaluations. Although most states have developed permit tracking systems, these are primarily administrative efforts to track individual permits through the regulatory process and not designed to contain program evaluation data. State reporting on plan implementation, where available, is descriptive rather than analytical. Data on shoreline ownership and inventories of shoreline resources have not been updated since program approval and outcome data on results of active state coastal land stewardship is scarce.

Table 2. Summary of State CZM Tools Employed to Protect Beaches and Dunes

TOOLS			A L	A K	A S	A	A	C	C	D	F	G	H	L	M	M	D	A	E	L	A	M	M	S	M	N	N	H	J	N	N	N	N	C	M	R	A	P	R	I	S	C	I	A	A	I	W	Total Yes																																											
REGULATORY & PLANNING TOOLS																																									29																																																		
Restrict Construction																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	28			
Restrict Shoreline Stabilizations																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	28	
Restrict Pedestrian or Vehicular Access																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	23	
Protect Habitat, Other Restrictions																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	25	
Permit Compliance Program																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	28	
Local Plan and/or Regulate																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	22	
Special Area Management Plans																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	12	
Other Adopted Plans																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	16	
DIRECT LAND MGT, RESTORATION AND ACQUISITION TOOLS																																									29																																																		
Shoreline in State Parks Management																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	29
Natural Areas Protected																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	25
Dunes Revegetated																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	13
Beaches Nourished or Renourished																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	17
Shoreline Armoring & Repairs																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	11
Coastal Lands Acquired																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	21
NON-REGULATORY TOOLS																																									29																																																		
Public Investment Restrictions																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	13
Public Investment Incentives																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	4
Coastal Property Disclosure																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	6
Education/Outreach/Technical Assistance																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	28
Financial Assistance																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	20
RESEARCH TOOLS																																									29																																																		
Methodologies for Shore Setbacks/Zones																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	19
Beach Profiles																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	23
Natural Areas Inventory																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	27
Technical Reports																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	29
Aerial Photos																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	29
Sea Level Rise Considerations																																									Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	25
Total Tools Employed - 25																																																																																											

**KEY:**

Y- Yes, Management Tool employed by state  
N- No, Management Tool not employed by state

Total Tools Employed out of 25: AI-15, AK-13, AS-12, CA-22, CT-21, DE-19, FL-24, GM-17, HI-19, LA-16, ME-21, MD-23, MA-20, MI-19, MS-16, NH-20, NJ-18, NY-20, NC-21, NM-14, OR-20, PA-11, PR-16, RI-16, SC-23, VI-13, VA-20, WA-15, WI-17.

Source: Individual CZM Profiles

Version 12/13/96

Table 3: Summary of State CZM Tools Employed to Protect *Bluffs and Rocky Shores*

STATES	AK	AS	CA	CT	GU	HI	ME	MA	MI	NH	NM	OR	PA	PR	RI	VI	WA	WI	Total YES
<b>RESOURCE PRESENT</b>																			
Bluffs/ Rocky Shores	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	n Y	Y Y	Y Y	Y n	Y Y	Y Y	Y Y	Y Y	Y Y	17 17
<b>REGULATORY TOOLS</b>																			
Restrict Construction																			
Bluffs/ Rocky Shores	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y n	- Y	Y Y	Y Y	Y -	Y Y	Y Y	Y Y	Y ?	Y Y	17 15
Other Regulatory Controls																			
Bluffs/ Rocky Shores	n n	Y Y	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y n	- Y	? ?	Y Y	Y -	n n	Y Y	Y Y	Y ?	Y Y	13 11
<b>PLANNING TOOLS</b>																			
Local, state, or special area	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	n n	n n	- Y	n n	Y Y	Y -	Y Y	Y Y	Y Y	Y Y	n n	13 13
<b>DIRECT LAND MGT</b>																			
State Owns and Manages																			
Bluffs/ Rocky Shores	Y Y	n n	Y Y	Y ?	Y Y	Y Y	Y Y	? Y	Y ?	- Y	? ?	Y Y	Y -	Y Y	Y Y	? Y	Y Y	Y Y	13 13
Natural Areas Protection																			
Bluffs/ Rocky Shores	Y Y	n n	Y Y	Y ?	Y n	Y Y	Y Y	? Y	Y ?	- Y	? ?	Y Y	n -	Y Y	Y Y	? Y	Y Y	Y Y	11 12
<b>ACQUISITION TOOL</b>																			
Lands Acquired																			
Bluffs/Rocky Shores	n n	n n	Y Y	? ?	n n	Y Y	Y Y	? ?	Y ?	- Y	n n	n Y	Y -	n n	? ?	n n	Y Y	Y Y	7 7
<b>NON-REGULATORY TOOLS</b>																			
Public Investment Restriction	n n	n n	Y n	Y n	n n	n n	n n	? ?	Y ?	- n	n n	n n	n -	Y Y	n n	Y Y	n n	n n	5 2
Coastal Property Disclosure	n n	n n	n n	n n	n n	n n	n n	n n	n n	- n	n n	n n	n -	n n	n n	n n	n n	n n	1 1
Education/Outreach/TA	Y n	Y Y	n n	Y Y	n n	Y Y	n n	Y Y	Y ?	- Y	n n	Y Y	Y -	n n	Y Y	Y Y	Y n	Y Y	12 9
Financial Assistance	Y Y	Y Y	n n	Y Y	n n	Y Y	n n	n n	Y ?	- Y	n n	n Y	Y -	n n	n n	n n	Y Y	n n	7 7
<b>RESEARCH TOOLS</b>																			
Inventories/ Designate protection area	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y Y	Y Y	Y ?	- Y	n n	Y Y	Y -	? Y	n Y	Y Y	Y n	Y Y	13 13
Technical Reports	Y Y	Y Y	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y ?	- Y	n n	Y Y	Y -	Y Y	Y Y	? ?	Y n	Y Y	14 12
<b>Total Tools Employed-13</b>	9 8	8 8	9 8	11 8	6 5	11 11	9 9	6 8	11 ?	- 11	2 2	10 12	10 -	7 8	8 8	7 8	11 6	9 9	

Key:  
Y- YES, Management Tool employed by state  
n- NO, Management Tool not employed by state  
- not applicable  
? unknown, not state data or insufficient data to determine answer

Resource Presence Summary:  
17 States with Bluffs: AK, AS, CA, CT, GU, HI, ME, MA, MI, PA, NM, OR, PR, RI, VI, WA, WI  
17 States with Rocky Shores: AK, AS, CA, CT, GU, HI, ME, MA, MI, NH, NM, OR, PR, RI, VI, WA, WI  
13 States with No Coastal Bluffs: AL, DE, FL, LA, MD, MA, MS, NH, NJ, NY ocean coast only, NC, SC, VA  
12 States with No Coastal Rocky Shores: AL, DE, FL, LA, MD, MS, NJ, NY ocean coast only, NC, PA, SC, VA

## 5 PROCESS INDICATORS OF EFFECTIVENESS

Key provisions of selected management tools are used as *process indicators* of effective state CZM programs in protecting *beaches, dunes, bluffs and rocky shores*. States with the following suite of regulatory, planning, direct land management and acquisition provisions are presumed to have effective programs:

### Regulatory Programs

- (a) **Coastal Setbacks** for development and redevelopment from beach, dune, bluffs, or rocky shores natural features, with the farther setback the more effective; the fewer exceptions allowed within the setback, the more effective.
- (b) **Coastal Construction Controls Areas** along the shoreline with regulations governing activities affecting beach, dune, steep slope bluffs, erodable bluffs, and rocky shores and limits on size, type, design or location of permitted construction to minimize adverse impacts on beach/dune/bluff systems; controls over new significant activities with few exceptions, control over additions/repairs/rebuilding; the more restrictive, the more effective.
- (c) **Shoreline Stabilization Regulations** which place limitations on the use of shoreline stabilization structures in favor of nonstructural solutions.
- (d) **Access Restrictions** with requirements for boardwalks or dune crossovers to minimize adverse impacts on dune; and areas designated where pedestrian and/or vehicular access is restricted to protect resources.
- (e) **Habitat Protection and Other Controls** over critical habitat areas where uses are restricted to protect habitat protection values.
- (f) **Permit Tracking and Enforcement Provisions** which are used to monitor permits and violations.

### Planning

- (a) **Adopted Plans** for areas containing enforceable policies that address resource protection, beach nourishment, inlet management, dunes restoration, or special area resource protection or conservation; the larger the resource area covered, the more of the shoreline included, and the more restrictive the enforceable policies, the more effective.

### State Coastal Land Management and Acquisition

- (a) **State Coastal Land Holdings** including inventory of the number, acres, shoreline miles of state lands in state oceanfront parks and preserves.
- (b) **State Coastal Land Management and Stewardship** including park management plans; boardwalks, dune cross-crossovers or other guided pedestrian access; dune restoration and beach nourishment where appropriate; enforceable policies restricting the use of shoreline stabilization structures; and designated natural resource habitat protection areas.
- (c) **State Coastal Land Acquisition Program** with coastal land acquisition as a priority.

Appendix C contains summary tables which describe the *key provisions* of regulatory and planning tools each of the twenty-nine coastal states utilizes to protect *beaches, dunes, bluffs, and rocky shores*, including setback requirements, regulations within construction zones, restrictions on shoreline stabilizations, access restrictions, and protection of critical habitat areas. Appendix C also contains summary tables on direct land management and acquisition tools associated with state ownership and management and land acquisitions, including coastline miles, miles of beachfront, state oceanfront park (miles, acres, number, and beach parks as subset), number of boardwalks or dunes crossovers installed, dunes revegetated, beaches renourished, shoreline armored, natural areas protected and lands acquired in beach/dune, bluff or rocky shore. Findings regarding state CZM process indicators of effectiveness in protecting *beaches, dunes, bluffs and rocky shores* are presented on the following pages.

## KEY ROLE OF STATE CZM IN COASTAL REGULATORY PROGRAMS

The inappropriate siting of structures on coastal barriers, in coastal flood zones, and on erodable bluffs is a problem which state CZM programs inherited. Thus when the state CZM programs began in the 1970s, certain portions of our nation's coastline were already committed to intense development and other areas were already zoned and platted for development. Shoreline erosion was a recognized problem, but land use controls were not well developed. State CZM regulatory programs have provided institutional mechanisms to balance competing demands along our shoreline and to minimize adverse impacts on valued natural coastal resources. State CZM programs have created new or implemented and refined existing coastline regulatory controls such as setbacks from beaches/bluffs, and controls over shoreline development and stabilizations. CZM programs have played a leadership role in the policy shift towards beach nourishment and shoreline retreat.

### COASTAL SETBACKS ★

\* All 29 coastal states with federally-approved CZM programs have controls over certain land and water activities along portions of their coastlines. All coastal states with developable beach/dune systems or bluffs have some form of state-mandated regulatory mechanism by which they prohibit or restrict certain types of *new development* in designated portions of their shoreline. The strength of the individual state setback or coastal construction control laws vary considerably depending on the setback distance, activities permitted, exceptions allowed, reconstruction provisions, level of government regulating development, and permit compliance and monitoring.

\* 22 of the twenty-nine coastal states have adopted land use regulations in the form of **setback requirements for new structures** that can be built on the shoreline. Another 2 states use locally-created setbacks.

\* Setback laws have a dual purpose: protecting the natural beach and dune or bluff systems as storm buffers and reducing the loss of life and property from hurricanes and winter storm events. Implementation of these laws has reduced the number and size of new structures that can be built on the shoreline and, for those built, located these structures as far landward from the water's edge as possible to prevent erosion from reaching the structures during their expected useful life. However, naturally migrating beaches have over time resulted in houses sitting on open beaches and then collapsing into the water. The effectiveness of setbacks in protecting natural beach and dune or bluff systems is limited in cases where development is allowed on portions of the dune systems, usually behind the crest of the foredunes where restricting private property rights is more difficult.

\* 10 of the 22 states **measure their setback lines** based on an arbitrary distance inland from the shoreline; 3 use erosion rates; 3 use resource features; and 5 use a combination of feet, erosion rates, and features. Determining which states have the most extensive landward setback boundaries is not practical, since the ways setback lines are measured vary considerably, as do the state geography and resources. For example, states vary in the shoreline location inland from which they measure their setbacks (mean high water, mean low tide, normal high water, crest of dune, elevation, or contour line.) The landward boundary also varies (feet, erosion rates, feet landward of coastal features.)

\* 16 of the 22 state setback laws contain provisions for **exceptions** which tend to weaken the effectiveness of the setback requirements. Examples include single-family dwellings within the setback if the land was platted before the effective date of the statute, or small parcels where there is not enough land to build behind the setback line. In some states, exception provisions have been added to state laws to avoid private property taking claims. Other types of exceptions include in-filling in developed areas, water-dependent uses, public interest activities, recreational activities, swimming pools, fences, boardwalks.

\* Coastal setback provisions for each state are shown in Figure 3, including setback distance and exceptions allowed seaward of the setback. Data was not collected on the methodology for setting the baselines and other technical information. There was insufficient data to determine the number of shoreline miles covered by state setback laws.

Figure 3: State coastal setback distance provisions and exceptions and type of setback

States <u>Setback distanced measured in feet or meters:</u>	
AL	40 ft landward of crestline (120-450 feet landward of MHWL). Exceptions- SF
AS	25 ft for residential; 50 ft for commercial from OHWL
DE	100 ft landward of seaward-most 7-ft elevation above NGVD. Exceptions-yes, if not sufficient land.
GU	Public access zone MHW and 25 ft inland from 2 ft contour line of Geo. Survey. 35 ft from MHW bounding beach. No higher than 25 ft. w/in 75 ft. of MHW. Exceptions- shoreline w/cliff/bluff higher than 25 ft, village lots > 100 sq meters in residential areas before WW1 Variances- recreation, commercial.
HI	40 ft. along most shorelines to upper reaches of wash of waves, usually evidenced by edge of vegetation growth, debris. Variances- 20 ft for small lots, shoreline stabilizations in public interest or hardship.
MD	75 ft from Normal High Water (NHW). Exceptions- fences, boardwalks.
NH	100 ft from High Ordinary Tide Line (HOTL) bordering tidal waters. Exceptions- public good, rebuilding. 5 ft from Mean High Water (MHW) for primary structures; 75 ft for septic tanks.
NM	In shoreline Area of Particular Concern (APC), 0-35 ft no construction from MHW; 35-75 ft no construction that obstructs visual openness; 75-100 ft. only SF.
PR	6 meter public right of way w/no structures. 50 meter setback from TM. 2.5 time ht setback w/in 400 meters of Territorial Maritime Zone (TMZ). Exceptions- urban zone lot, adjacent structures setback less, water-dependency.
WI	75 ft from Ordinary Mean High Water (OMHW). Exceptions- piers, boat hoists, boathouses.
States <u>Setback distance measured by erosion rate:</u>	
FL	30-year erosion line for major structures from SHWL. Exceptions- SF
MI	Sand dune setback 100 ft landward from crest of first landward ridge not a foredune. Bluff high risk area setback 30-year erosion projection plus 15 ft. Exceptions- substandard lots approved prior to law.
PA	Bluff setback of 50 times annual rate of recession from the bluff-face for residential; 75 times for commercial, at least 50 ft. Exceptions- parcels subdivided prior to law if structure moveable.
VA	30-year erosion rate or 20 times local recession rate from MHW for barrier islands Exception- public interest activities.
States <u>Setback measured by landward extent of resource features:</u>	
NY	No moveable structures or major additions within "environmental hazard areas."
OR	No building within "beach zone." No building on beaches, active foredunes, other conditionally stable foredunes subject to ocean undercutting and wave overtopping, and intertidal plains subject to ocean flooding. Exceptions- in-filling where protection provided, on older-stabilized dunes.
SC	From MHW to crest of primary oceanfront sand dune. Exceptions- swimming pools.

Figure 3: State coastal setback distance provisions and exceptions and type of setback (continued)

States. <u>Setback measured by combination of setback, feet and/or resource feature:</u>	
ME	No structures on frontal dunes seaward of 100 year floodplain and sea level rise area. Shoreline setback 75 ft for residential; 25 ft for general development/commercial; 250 ft from Normal High Water Line (NHWL) in Resource Protection Areas. (feet & resource)
NJ	V-zone setback for residential. Exceptions- beach related commercial. 30-year erosion for 1-4 DU.; 60-year erosion setback for larger in erosion hazard areas. Baseline for setback varies by site (crest of coastal bluff, dune crest, first line of vegetation, landward edge of 8-ft. elevation). Exceptions- SF and duplex in-fill, shore protection. 25 ft setback from shore protection structures for all permanent structures. (erosion rate and feet)
NC	Structures less than 5,000 sq. ft, setback landward of 30-yr erosion rate, crest of primary dune, toe of frontal dune, 60 ft from 1st line of stable vegetation. Exceptions- lots platted before law. Structures greater than 5,000 sq. ft, 60-yr. erosion rate or 120 ft from mean vegetation line. (erosion, feet, features)
RI	50 ft from coastal features or 25 ft from coastal buffer zone. Exception- water-dependent activity; 30-year erosion rate up to 4 units, 60-yr erosion rate larger structures in critical erosion areas. Dune construction setback on 3 barrier beaches seaward of utilities/wall of existing development. No development on beach face, sand dune, undeveloped barrier beaches. Exception-stabilizations, access, public utilities, public welfare.
VI	50 ft from MLT or inland boundary of natural barrier. (feet & resource)
Key: MHLW- mean high water line OHWL- ordinary high water line SF single family DU dwelling unit	
Note: 22 states with state setbacks. 2 states with local setbacks- CA, WA.	
5 states with no setbacks: AK, CT, LA, MA, MS.	
Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.	

**The North Carolina's strong oceanfront setback law uses erosion rates to determine setbacks and keep development out of ocean hazard areas.** Within the "Ocean hazard Areas of Environmental Concern"-- sand dunes, ocean beaches, and other areas exhibiting substantial possibility of excessive erosion-- setback are based on average annual erosion rates, natural site features, and the nature of the proposed development. The setback is measured from the first line of stable natural vegetation or aerial photos/ground survey where no stable vegetation. New structures smaller than 5,000 square feet and fewer than 5 residential units must be set back the farthest landward of the following: 1) a distance equal to 30 times the long-term annual erosion rate; 2) the crest of the primary dune; 3) the landward toe of the frontal dune, or; 4) 60 feet landward of the vegetation line. Larger structures must be set back 60 times the average annual erosion rate or 120 feet landward of the vegetation line. Where erosion rates exceed 3.5 feet per year, the setback line for larger structures is set at 30 times the erosion rate plus 105 feet. The law was passed in 1974, made part of the coastal program in 1978, and amended in 1981 to allow single-family residences on pre-existing lots not deep enough to meet the erosion setback requirements, as long as they are set back at least 60 feet. The coastal program has focus attention on studying erosion rates used in determining setbacks.

**The Pennsylvania Bluff Recession and Setback Act provides a long-term regulatory approach to reducing property losses from bluff recession along Lake Erie.** The act requires municipalities in bluff recession hazard areas to administer bluff setback ordinances which restrict new development from bluff areas and limit improvements to existing structures within the minimum bluff setback. Setback distance is based on the rate of erosion (feet per year) multiplied by the life span of the structure. Life span for residential development is 50 years; commercial is 75 years; and industrial is 100 years; or at least 50 feet from the crest of the bluff. The major effect of this program has been to keep new development a safe distance from bluff recession hazard areas. CZM provides technical assistance to Lake Erie property owners affected by bluff recession, consisting of on-site inspections and recommendations on surface and groundwater control, bluff stabilization and the role of vegetation to stabilize loose soil conditions. In the first seven years of the service (1981-1988), approximately 3/4 of the surveyed property owners followed CZM's recommendations, resulting in an estimated property damage savings and property value enhancement of \$5.2 million. Pennsylvania is the only Great Lakes state to offer this service.

## **COASTAL CONSTRUCTION CONTROL AREAS** Ⓢ

\* 27 coastal states have established land use regulations using a ***coastal construction control area or zone*** within which they regulate the location, size, and other conditions of development. Provisions used to protect natural beaches and dunes include siting and design guidelines to locate structure as landward as possible, minimizing disruption of dune vegetation, dune revegetation and landscaping requirements to recreate dunes and vegetation destroyed during construction, and limitations on development square footage and density. 23 coastal states use both a ***setback and construction control area*** approach.

\* The coastal construction control areas are smaller geographic areas than the states' coastal zones, focusing regulatory controls over activities along the ***immediate shoreline***. In most cases, a state's coastal zone extends more landward to cover watersheds and other inland features. Regulatory controls along the immediate shoreline, such as setbacks and construction regulations, may not apply to more landward areas within the state's coastal zone.

\* The purpose of coastal control areas is to allow activities along the shoreline but to minimize their negative impacts on natural shoreline resources and adjacent properties. Control area regulations presume that some adverse effects will occur in balancing coastal development and resource protection. Some coastal states have strengthened their regulatory program by eliminating exemptions, extending regulatory jurisdiction, and placing limitations on additions, repairs and rebuilding. As a result, less harmful and inappropriate development is occurring along out nation's shorelines, and the development that is permitted is taking into account the resultant negative and cumulative impacts.

\* 19 of the 27 coastal states with regulatory control areas ***exempt*** certain activities from the permit program. Examples of exempted activities include single-family, water-dependent uses, public purpose uses, recreation, agriculture, decks, walkways, in-filling, and small lots platted before law took effect. Such exempted activities tend to weaken the effectiveness of the control zones in protecting resources. In addition, only 10 of the 27 states with regulatory control areas contain ***limitations on additions*** to structures built within the setback area or within the construction zone. Limitations include maximum square footage, moveable structures, and location landward of setback.

\* 12 of the 27 coastal states with regulatory control areas place ***restrictions on the repair or rebuilding of a structure damaged*** during a coastal storm event. For example, in some states, structures that are damaged in excess of a specified threshold (e.g., 50% of assessed value), and which are located in the setback area, must be relocated landward of the setback line. 16 states participated in the relocation or demolition benefits under the Upton-Jones Act, prior to its termination in 1995. State requirements often differ from NFIP standards. (See Appendix A, Table 4)

\* Each of the 27 states with coastal construction control area programs has ***unique regulatory features*** which reflect their particular physical, social, economic or political priorities. **Figure 4** below shows the diversity of regulatory jurisdictions, activities exempted, and restrictions on additions and repairs



Figure 4: State coastal construction control area jurisdictions and provisions

State	Regulatory Jurisdiction--Distance Inland	Activities Exempt	Restricts Additions	Restricts Repairs.....
AL	40 ft inland from crestline to 10-ft. elevation line	SF	no	y-if damaged<50%
AK	District Control Zones- flood/hazard/erosion areas	uk	no	no
AS	1) 200 ft. from MHW 2) coastal hazard areas 3) territory-wide grading,excav.,fill,steep slopes	PP, R, WD, SF no no	no no no	no no no
CA	MHT to 1st public road or 300 ft. from beach/bluff or MHT if no beach	SF	yes-except SF	yes-except SF
CT	MHW inland to 1000 ft or 100 ft from state regulated areas	SF, A, O	yes-except minor	yes-except minor
DE	landward of 100 ft. setback inland 100 yds. North of Wilmington to ~12 miles in SE.	no	no	y-damaged >75% y-foundation >59%
FL	SHW to landward extent of 100-yr. floodplain.	no	no	no
GU	1) Seashore Reserve seaward to 10 fathom contour, all islands, inland from MHW to 10 meters or edge of public right of way. 2) flood hazard area	Maintenance Dredging no	yes-except SF no	y-if damaged >50% no-SF >\$7500 no
HI	1) SMAs: 100 yds inland, cover resource areas or to inland coastal road. 2) Island-wide land use boundary changes 3) Nat.Resource Conserv. District use permit	SF, uses<\$25,000 no no	no na no	no na no
LA	Inland to intracoastal waterway, highways, natural ridges, parish boundaries.	SF	no	no
ME	1)On mapped coastal dunes. Frontal dune inland 125-175 ft. 2) protected natural resource areas, 100-year floodplain	O SF	y- floor area>30% no	yes- new standards no
MID	On coastal sand dunes 250 ft. from NHW.	SF outside dunes	no	no
MA	Tide-flowed tidelands, filled tidal flats between waterway and 1st public way or 250 ft. from water	no	no	no
MI	1) designated critical dune areas w/in 250 ft.dune>3 acres,>4 units 2) high risk bluff erosion areas inland 1000 ft + 15 ft. 3) 500 ft. of stream for earth change permit	no no no	no no na	yes-exceptions yes-moveable na
NH	1) HOTL inland 100 ft. bordering tidal waters. 2) OHTL inland 250 ft	public good, in-fill A, O	no no	no no

Figure 4: State coastal construction control area jurisdictions and provisions (continued)

State	Regulatory Jurisdiction--Distance Inland	Activities Exempt	Restricts Additions	Restricts Repairs.....
NJ	1) MHW inland 500 ft 2) erosion hazard areas 3) dunes, overwash areas, beaches, bluffs	no SF, duplex in-fill no alternative	no no no	no no no
NY	Designated erosion hazard areas- a) beach dune, shoal, bar, spit, barrier island, bluff, wetland, assoc. natural vegetation; b) 40-year erosion area.	no	yes-except moveable structures	no
NC	AECs-Ocean Hazard Areas 1) ocean erodable areas MLW inland to 145- 700 ft.; 2) high-hazard flood areas; 3) inlet hazard areas 4) unvegetated beach areas.	Lots platted before law, minor permits <60,000 sq ft. get local permits	y-setbacks apply	y-setbacks apply
NM	4 APCs: a) shoreline APC MHW inland 150 ft.	no	no	no
OR	1) extreme low tide and line of vegetation 2) coastal town boundaries	no na	no na	no
PA	landward of crest of bluff 50 to 200 ft. depending on erosion rate and type of development.	yes-parcels subdivided before law if moveable, utilities, 3 miles non-erosion bluff area	yes	yes if >50% market value
PR	1) 1000 meters inland from shoreline 2) flood areas 3) maritime zone-territorial waters, submerged lands	yes-depends on Zone no no	no yes no	no yes-must protect no
RI	Inland 200 ft. from coastal feature- beach, dune, beach, coastal bluff, rocky shore, etc.	yes*	yes-if not priority use	yes- on barrier bch
SC	40-year erosion zone	no feasible alt., swimming pools, O	>5000 sq ft.	y-damaged >662/3%
VI	Mapped are based on roads, landmarks, property lines.	minor activity <\$17,000	no	no
VA	Coastal primary dunes and beach	uk	uk	uk
WA	200 feet inland from shore	uk	no	no
WI	OHWM inland 100 ft.	piers, O	no	no

Key: SF- single family, PP-public purpose, WD- water dependent, R- recreation, A-agriculture, O- other such as temporary structures, decks, walkways. uk- unknown Activities Exempt- covers activities not subject to regulations

\* RI has complex regulations with exceptions tied to water type and priority uses.

NOTE: 28 States with control zones along beach, bluff, or rocky shoreline. 2 States with no control zone along beach- MS, PA.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

**The Maine Coastal Program illustrates the complexity of regulating diverse resources such as beaches, bluffs and rocky shores. Maine uses three coastal construction regulatory programs. Under the Natural Resources Protection Act, coastal frontal sand dunes and back sand dunes are mapped and protected. There is a de facto setback from frontal dunes. In back dunes, there is a size limit of 2,500 square feet, the structure must be moveable, and elevated above 3" sea level rise, with multifamily elevated higher. Reconstruction of structures damaged >50% is prohibited unless all new building standards are met, including minimal damage to dunes, lot restrictions, bird habitat protection, and revegetation of disturbed areas. Additions may not expand floor area or volume by more than 30% of existing structure. Exceptions include maintenance and repair of existing structures, temporary structures, walkways, open decks smaller than 200 square feet, and underground storage tanks outside the V-zone. State permits are also required for activities within "protected natural resource areas" which include the 100-year flood zone, moderate/high value wetlands, and steep slopes greater than 20%. Development in "protected areas," with the exception of single family residential, must be set back 250 feet from normal high water line. The Municipal Shoreland Zoning Act mandates local zoning with a 75-foot setback for residential and 25 ft for general development/commercial.**

**The Rhode Island Coastal Program is an example of a strong regulatory program with defined criteria addressing identified resources, activities, and management issue areas. Activities are regulated within and 200 feet landward of defined coastal features—coastal beaches and dunes, barrier beaches, bluffs, cliffs and banks, rocky shores, and manmade shoreline. Complex coastal zoning designates what types of activities are permissible on shoreline features, tied to 6 state water classifications. About 75% of the shoreline is adjacent to Type I Waters (Conservation) or Type 2 Waters (Low Intensity Use Areas) where alteration or construction or shoreline features and undeveloped barrier beaches is prohibited. In addition, activities are regulated by different setbacks from beaches and dunes, critical erosion areas, and coastal buffer zones. There are also regulations for specific types of activities (such as dredging, filling, new residential structures) as well as 17 designated coastal hazard areas and 18 identified erosion-prone areas. On barrier beaches, all residential and non-water dependent structures on dunes destroyed >50% may not be reconstructed regardless of insurance carrier coverage. Additions are allowed only to structures designated priority permissible uses.**

**The Michigan Coastal Program is a multi-faceted program which has specialized regulatory controls for different types of areas. Under the Shorelands Protection and Management Act (SPMA), three types of areas are regulated: 1) high risk areas—subject to bluffline recession; 2) environmental areas—fish and wildlife habitat; and 3) flood risk areas—flood-prone areas due to changes in Great Lakes water level. The "high risk erosion areas" have been surveyed and designated. Included are all areas with erosion > 1 foot per year over 15 or more years. This area can extend inland from MHW as far as 1,000 feet from the bluffline. Setbacks are required and based on 30-year bluffline erosion projections. Within the setback area, new permanent structures are prohibited, and lakeward relocation of existing structures is prohibited. Existing structures in front of the setback line cannot be moved lakeward and any addition must be located landward of the setback line. Repairs to deteriorated or damaged structures >60% of building's replacement value must meet new setback standards. If less than 60%, structures can be restored to previous condition. Exceptions to the setback for small lots granted if waste handling system is landward of the structure, the structure is moveable and located as far landward as possible, and the building meets engineering standards. For structures in danger from erosion with access routes too narrow or steep to relocate the structure, shoreline stabilization permits may be granted, but only after all other options are exhausted and sewer and engineering standards are met.**

**Major regulatory amendments in 1992 expand the definition of bluffline to include non-bluff areas subject to erosion. All "zone of imminent danger"—area landward of bluffline where erosion anticipated in the next 10 years—must be designated. An additional 15 feet was added to the setback to address severe short-term erosion or landslides or high water. Construction requirements were eased. Additions are allowed if existing building and addition are moveable, the addition and the foot-print does not exceed 25% of the building's foundation, and located landward of zone of imminent danger. Reconstruction of substantially damaged structures (60-100% of replacement value) is allowed if damage not caused by erosion and if structure is not reconstructed in zone of imminent danger and is readily moveable. Small structures (.3,500 square feet foundation and >5 units) must be moveable if built between setback and 2 times setback distance. For larger structures, the setback is doubled.**

*The Sand Dunes Protection Act of 1976, strengthened in 1989, protects critical dune areas within 2 miles of the Great Lakes, much farther inland than the 1,000 feet SMPA high risk erosion area jurisdiction. Regulations may extend inland 250 feet from a critical dune area. A 100-foot setback from the crest of the dune is required unless dune stability standards are met. Development, silviculture and recreation affecting dunes and contour changes is regulated. Building is not allowed on slopes 25-33% without registered plan or slopes >33% without a special exception. Special use projects are regulated including industrial, commercial, multi-family >3 acres or >4 units per acre. Variances can be granted for rebuilding of nonconforming structures within critical dune areas if built prior to act and destroyed by fire or non-erosion forces or made nonconforming due to erosion.*

***The Puerto Rico Coastal Program is characteristic of state CZM programs adopted by the island states, territories and commonwealths where regulations are island-wide. Puerto Rico regulates development through island-wide land use policies and zoning districts. In addition to three shoreline setback areas, permits are required for activities within 1000 meters of the shoreline or farther inland to include important natural resources, as well as all offshore islands. There are 14 zoning districts within which specific activities are allowed. For example, no subdivisions are allowed in the following three Districts: Conservation of Resources District (CR); Conservation and Restoration of Resources District (CRR); and Resource Preservation District (PR). Exceptions granted in CR District for tourist-related recreation if the public interest and natural environment not adversely affected. In the Public Beaches District (PP), subdivisions and development allowed for hotel/vacation facilities, tourist villas, restaurants, recreation, wharves, docks and other water-dependent or water-related activities. Puerto Rico also required Flood Areas permits for activities in Floodprone zones. In Zone 1 (floodways) development and major renovations are prohibited. Exception-existing structures cannot be expanded unless protected. Zone 1M(v-Zone) and Zone 2 (low areas) allows new development and modifications to existing subject to design/building requirements. There is also a relocation program in coastal high hazard flood areas. Effective beginning in 1992, there is a Maritime Control Zone and required state Authorizations and Concessions for nonconforming uses in the maritime zone- mapped territorial waters, submerged lands, inland to reaches of low lands beneath by ebb/flow of tides.***

## **SHORELINE STABILIZATION REGULATIONS**



\* The primary purpose of shoreline stabilization structures is to protect upland structures affected by coastal erosion, by stabilizing the shoreline. Most types of shoreline armoring impede natural sand migration, thereby causing erosion and resulting in the loss of natural beach. States which prohibit the use of shoreline stabilizations give priority to the protection of natural beach processes. As a result of inappropriate development along migrating shorelines, the accepted practice prior to CZM was to allow seawalls, bulkheads and groins in an effort to protect structures threatened by coastal erosion. Greater awareness of the negative impacts of shoreline stabilization structures on adjacent properties and coastal resources has caused CZM programs to more carefully scrutinize such activities and weigh the private and public benefits.

\* 28 coastal states **regulate the use of shoreline stabilizations structures**. All 28 require permits for *new* shoreline stabilizations and place conditions on *new* activities to minimize adverse impacts on adjacent land, natural resources, sand supply, erosion, and drainage. Protection of existing upland structures is a common reason for granting permits.

\* 22 coastal states generally **allow new** shoreline stabilizations if impacts are minimized. Most approval must meet criteria such as water-dependency, public benefit, erosion present, nonstructural alternatives not feasible, etc. A few states require structures to be designed to meet 30-50 storm/erosion events.

\* 6 coastal states **prohibit new** shoreline stabilization structures along all or portions of their coastline. Exceptions are granted by some states if structures or infrastructure are in imminent danger of collapse from erosion.

- 7 coastal states do not require permits for the **repairs or reconstruction** of shoreline stabilizations. 4 states set 50% damage thresholds and 2 require a rebuilding permit while 2 do not require a rebuilding permit. South Carolina prohibits repair or rebuilding of stabilizations if structures are damaged over a

certain percent. Oregon prohibits erosion repairs on oceanfront lots platted before 1997 where no infrastructure improvements exist.

\* Most coastal states have regulatory language which *promotes nonstructural solutions*. Some states require applicants to exhaust nonstructural alternatives before granting structural permits.

\* Each of the 28 states regulating shoreline stabilization structures has *adopted unique provisions* which reflect their level of shoreline development, erosion pressures, and political priorities. Figure 5 summarizes the restrictions associated with shoreline stabilizations.

Figure 5: State coastal shoreline stabilization structure (SSS) restriction provisions

State	Restriction provisions
AL	No SSS allowed on Gulf-front. Exceptions, case-by-case, if structure built prior to law and threatened by erosion. Allowed by permit on Bay, a permit required for repair/reconstruction.
AS	Allowed by permits only in developed areas to protect property from erosion and if public safety/health risk; no feasible alternatives, habitat affected evaluated; adverse affects on nearby areas and habitat, drainage and shoreline alternations minimized.
CA	Allowed by permit for coastal-dependent uses, to protect existing structures or public beaches in danger of erosion if designed to eliminate/mitigate adverse impacts on local shore sand supply. Can replace SSS damaged >50% without permit. Along cliffs, allowed to stabilize slope or check marine erosion where no less damaging alternative.
CT	Allowed by permit to protect infrastructure, for water-dependent uses, existing inhabited structures, if bluff slope not greater than 3:1. Groins/jetties allowed where non-structural alternatives infeasible.
DE	Allows by permit new and repair to existing SSS.
FL	Allows by permit new and repairs to existing SSS.
GU	Permit required, but none since 1970s issued. Relies on USACE standards.
HI	Allows but requires variance to demonstrate public interest or hardship. No SSS which interferes with beach processes. State regulates from shoreline seaward. Counties regulate above shoreline.
LA	Allows new but regulates to minimize downstream land loss. No restrictions or permit for repairs/rebuilding if damaged >50%.
ME	Prohibits new rip-rap, seawalls, groins, other SSS on sand dune system, except existing seawalls may be maintained and repaired unless building behind SSS damaged more than 50%. Effective 1995, existing seawalls can be fortified, build bigger and deeper if undermined. Within 32 designated natural coastal barriers, no state funds for new SSS if incompatible with protection values.

Figure 5: State coastal shoreline stabilization structure (SSS) restriction provisions (continued)

MD	Allows new and repair of existing. Nonstructural stabilization encouraged.
MA	Allowed to stabilize shore, rehabilitate existing structures, if minimize encroachment in waterway. Seawalls, bulkheads, revetments must be located landward of MHW, except for proper tieback placement, obtain slope stability, or be compatible with abutting SSS below MHW. Encourages Nonstructural alternatives where feasible. No restrictions on reconstruction. If adverse impacts occur, state may require modifications/removal.
MI	Allowed but must be designed to meet/exceed 20-year storm event for small structures; 50 year storm event for large structures. Must be 30 feet from erosion zone and landward of zone of imminent danger.
MS	Allows new and repairs to existing SSS.
NH	Allows new. No restrictions on reconstruction. SSS considered in public interest and generally allowed for protection of upland structures. Considered a major project if in dune, tidal wetland or within 100 feet of HOTL. Minor projects include beach nourishment <10 cu yd or removal of sand, rock, gravel <20 cu yd. Minimal impact projects- repair retaining wall.
NJ	Allowed based on 7 conditions- to protect water-dependent uses, heavily used public recreation areas or existing structures and infrastructure in developed shorefront areas. Although nonstructural solutions preferred, SSS deemed essential given NJ's urbanized shoreline.
NY	Allows new by permit. Repair/reconstruction allowed without permit. SSS must be designed to control erosion for 30 years, be unlikely to increase erosion, minimize adverse effects on natural protective features, other erosion structures and natural resources. Must include long-term maintenance program. Variances from regulations for hardship and not alternative site, mitigation measures, safe from flood/erosion damage, public benefit if public funds used.
NC	Effective 1985, no new SSS. Temporary sand bags and beach nourishment allowed. Repairs to existing do not require permit, but replacements require permits. Exceptions to SSS prohibition- emergency DOT SSS to protect historic sites, groin at north end of Pea Island to protect bridge foundation across Oregon Inlet- only road access to barrier island. Policy preference for beach nourishment and relocation of structures.
NM	Allows new and repairs. Must not interfere with coastal processes or inhibit access to shoreline.
OR	Allows new, but must be built as far landward as possible above MSL to prevent encroachment. Allows repairs/replacement if within 3 years of damage. Prohibits erosion repair on lots where no physical improvements (i.e., building, road, water lines, sewer lines) on existing oceanfront lots platted before 1977. Promotes nonstructural solutions, SSS must be designed to minimize adverse impacts. Allows emergency new and repair SSS if property in imminent peril from erosion.
PA	Allowed from MHW lakeward. Groins allowed 50 feet from water's edge. No regulation of SSS above MHW. No permit required for repair/reconstruction. Priority is bluff-erosion prevention.
PR	Allowed for new and repairs. Relies on USACE standards.
RI	Allowed but must exhaust nonstructural alternatives. Prohibits new SSS on barriers in type 1 waters. Limits use of riprap to protect septic systems/ancillary structures. Permitted SSS must demonstrate that erosion exists, SSS will control erosion, nonstructural SSS does not work, no reasonable alternatives will not increase erosion, long-term solution and maintenance program and financial commitment. Repair/reconstruction SSS damaged >50% requires a new permit.

Figure 5: State coastal shoreline stabilization structure (SSS) restriction provisions (continued)

SC	Since 1988, no new SSS along beach except to protect public highways in existence in 1990. Since 1990, restricts reconstruction of SSS based on degree damaged in certain years. After 2005, damaged >66 2/3% above grade cannot be repaired or rebuilt. Sand bags, sand scraping and beach nourishment allowed as exceptions.
VI	Allows new by permit and environmental assessment. Repairs/reconstruction do not require permits. Prohibited within 50 feet of open shore setback and siting policies to minimize adverse impacts.
VA	Effective 1990, new SSS prohibited under any circumstances. Prior to 1990, preference for nonstructural measures. Exception-SSS allowed on portions of Virginia Beach where private upland structures in imminent danger from erosion.
WA	Allowed, except no new groins or jetties since 1985.
WI	Allows new and repair.
Total	28 states regulate SSS through state permits; 1 state (AK) relies on USACE permit.

Key: SSS- Shoreline Stabilization Structures- refers to erosion control devices designed to harden the beach or shoreline. Includes seawalls, rip-rap, revetments, groins and jetties.

Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

**South Carolina Developments Erosion Retreat Policy.** The 1988 Beachfront Management Act and the 1990 Amendments established an erosion retreat program which requires the SCCC to develop setback lines derived from expected beach erosion over 40 years. Beachfront development prior to 1977, the year that the State CZM statute was enacted, and from 1977 to 1988 resulted in a steadily increasing loss of the State's public beach resources. No better example of this trend exists than the development of the Garden City areas in Horry County. This unincorporated beachfront community in Horry County developed from 1977 till 1985 from single family beach cottages to high rise hotels and condominiums at the water's edge. In each case, the buildings and swimming pools occupy virtually the entire square footage of the beachfront lots behind seawalls and revetments that leave little or no dry sand beach for much of the day. This development has taken place since the State CZM program was enacted in 1977. This law provided little consideration for the protection and conservation of the public beach or for the dynamics of the changing beachface from erosion and storms. The proliferation of hard erosion control structures in this area has significantly narrowed the beach and flattened the beach profile resulting in a much less appealing tourist destination when compared to other areas with healthier beaches. The storm hazard potential has also been greatly heightened. The policy of retreat established in the 1988 legislation will require decades to correct this problem, while repeated, expensive attempts at beach renourishment will be required in the short run to rebuild public beach. State-of-the-art scientific and technical expertise has been and continues to be used to refine the methodologies on which the state bases its shoreline construction retreat policy. This includes methodologies to protect structures from shoreline erosion and damage from storms. (Source: Chris Brooks, South Carolina Coastal Program)

**California allows by permit new stabilization construction and repair to existing shoreline stabilization structures.** In 1992, the California Coastal Commission (CCC) undertook a pilot Regional Cumulative Impact Project (ReCAP) to study development impacts along an 83 mile-long coastal stretch covering the two central California coastal counties of Santa Cruz and Monterey. This study looks at policies governing shoreline armoring activities; resource conditions measured by changes in amount of armoring, and permitted activity related to shoreline armoring. A major finding of the study is that the current coastal policies support the use of public shoreline and public resources to protect private property, and if the current situation continues, more and more of the public shoreline will be lost as a public resource. On-the-ground outcome data indicates that, between 1978 and 1993, the percent of the shoreline armored in the ReCAP pilot area increased from 9.6 miles to 12.0 miles. Approximately 1/8th of the shoreline is now armored. This estimate does not include

lengths of beaches protected by breakwaters, jetties, or groins, nor do the figures for length reflect maintenance and additions of rock to existing walls. Much of the increase in armoring between 1978 and 1986 is thought to have been constructed in response to storms in the late 1970s and early 1980s. Future demand for shoreline protection will depend on trends in development along the shoreline, erosion potential and storm frequency. Based on private property ownership, land use and physical characteristics, development patterns, and continued implementation of existing policies, it is estimated that 1/3 of the ReCAP coastline, or 27 miles, could be armored in the future.

Armoring has led to cumulative impacts to beach areas and access opportunities, affecting sand supply and landward retreat of the beach. Along the ReCAP shoreline, data indicate that protective structures cover ~25 acres of beach. Permits granted since 1978 represent about 5 acres, or 20% of this total. Although shoreline armoring data indicates that armoring and encroachment has slowed under CZM, the impact from such encroachment may still be significant. Many of the armoring projects were approved in the popular recreational areas of Santa Cruz County. Armoring is often put in place following emergency storm events. However, permits are approved with little or no technical analysis, review of alternatives, or review of mitigation for adverse impacts on resources, and no followup permit. Therefore, such projects do not receive full regulatory review or monitoring, and are usually in areas of significant long-term or storm related erosion. As a result, impacts from these projects have not been fully assessed or mitigated.

The policies governing shoreline development and building setbacks for much of the shoreline development in urban portions of the ReCAP pilot are often inadequate. CC Act policies are inconsistent. One requires that new development be stable without construction of protective devices to minimize hazards. Another policy allows shoreline armoring to protect existing structures. There is no cutoff date for when a structure can be considered existing. Storm damaged structures are exempt from permits if reconstructed in same footprint, thereby, precluding more landward redevelopment, risk avoidance, and reduction of dependence on protective devices. Setbacks are a common LCP management approach to avoid armoring. However, most are based on long-term average erosion and do not incorporate episodic events which may exceed setbacks. This leads to structures in harms' way and future need for armoring. In the ReCAP region, LCPs generally develop setbacks based on 50-year economic lifetime for new development. Those structures exceeding that lifetime will ultimately require armoring for long-term protection. Development on infill lots is allowed to be as seaward as adjacent existing development, exacerbating erosion risks and the need for armoring. Current policy does not restrict development in areas of high hazard. Future development is likely to continue with adverse impacts on coastal resources and public costs involved in protecting private development. Regional Plans are recommended to address adverse impacts of shoreline armoring. Source: ReCAP Pilot Project; Executive Summary and Findings and Recommendations.

## **ACCESS RESTRICTIONS, HABITAT PROTECTION AND OTHER CONTROLS** ➤

\* The purpose for regulating beach access is to two-fold. One reason is protect the stability of the vegetation within the beach, dune and bluff system and retaining their storm buffer benefits. The other is to protect critical natural habitat areas from human encroachment. Coastal beaches, dunes, bluffs and rocky shore areas provide critical habitat for certain animals and plant species that are endangered or threatened with extinction such as bird nesting sites, sea turtle nesting sites or other state-designated essential wildlife habitat set-aside and regulated as part of the state CZM programs. Coastal endangered bird species include shorebirds and seabird such as the bald eagle, piping plover, northern harrier, osprey, upland sand piper, and common tern.

\* 22 coastal states **restrict pedestrian access** by requiring the use of boardwalks, trails, dune cross-crossovers, beachfront stairs, and other structural accessways. Prior to the 1970s, public access cutting through and breaching dunes was a common practice. With CZM, guided access on both private and public dunes has become accepted practice.

\* 22 coastal states **restrict vehicular access** along portions of the beachfront or shoreline. Types of restrictions include only allowing beach clean-up, emergency or law enforcement vehicles, prohibiting driving on public beach areas or designated habitat areas, allowing only certain types of vehicles, and creating physical barrier to the shoreline. Certain beachfronts historically were public transportation routes or beaches used as race-ways. Today, driving and parking on hard sandy beaches with access through vehicular access ramps is considered locally acceptable ways to provide public beach access.



\* 28 coastal states **protect coastal shoreline habitat** through regulation. The most common areas protected are bird staging and nesting areas along the coast. Other areas include turtle nesting sites, endangered species habitat, natural areas, and natural heritage areas. Regulation of turtle and bird nesting sites is seasonal and tend to cover only a small portion of the coastline.

\* 25 coastal states **regulate other activities** which affect natural coastal resources. This primarily includes sand mining, dune reshaping, sand scraping, and dune creation. Both on-shore and offshore sand extraction can have long-term adverse impacts on beach and dune systems. Historically, dunes and beach areas were used commercially as a source of sand for construction, resulting in the loss of many beachfront dune areas. Commercial use of sand remains an issue in a few states, but most now restrict or prohibit the taking of beachfront sand. Sand dune grading and dune reshaping are issues affecting accreting coastlines where too great accumulations of sand obstruct views and access. Dune creation and sand scraping are issues along storm-event and long-term erosion affected coastlines.

***The Florida Coastal Program requires state permits for boardwalks and dune crossovers to the beach. Thousands of permits are issued for these accessways. The South Carolina Coastal Program allows construction of walkways over sand dunes as an exception if the accessways are no greater than 6 feet wide and other criteria are met. Wider accessways and handicap access requires state permit approval. In both states, the goal is to minimize the adverse effects of vertical access through fragile dune areas to the sandy beaches. Whereas dune breaching was common practice prior to state regulations, guided accessway over dunes to avoid damage to the natural and protective functions of dunes is the accepted practice.***

***The Oregon Coastal Program restricts vehicular traffic by Parks Department administrative rule. Along certain beach/dune areas, vehicular access is restricted to protect endangered snowy plover habitat, recreation, and avoid use conflicts. Beach vehicular accessibility is shown on the Official State Map of Oregon 1995-1996. Vehicles are prohibited year-round or from May to September along an estimated 70% of the coast.***

***The Maine Coastal Program protects shore bird nesting or breeding areas. Bald eagles, roseate tern, least tern, piping plover are coastal endangered species and their habitat are mapped and protected under Maine Endangered Species Act as "essential wildlife habitat" by Inland Fisheries and Wildlife. Designated areas include: seabird nesting islands; shorebird nesting, feeding and staging areas; atlantic salmon spawning areas; and critical waterfowl and waterbird areas. The Department of Inland Fisheries and Wildlife reviews state and local permits to ensure these habitat are protected. Prior to issuance of a local or state permit, the applicant is required go through a consultation process with the Department staff. Construction of new fences and reconstruction of closed fences are prohibited; open fences are allowed only to protect dune vegetation or bird nesting areas.***

Figure 6: Coastal restrictions on pedestrian and vehicular access, habitat protection and other activities

State	Pedestrian Access	Vehicular Access	Habitat Protected	Other Activities
AL	y-boardwalks n-dune crossovers	y- only clean up, law vehicles allowed on bch	y- turtle & tern nesting, beach mouse habitat	no
AK	y-trails regulated	y-transportation routes	y-bald eagles	y-sand mining
AS	no	no	y-case-by case habitat	no
CA	y-boardwalks/walkways	y	y- env. sensitive areas	y-sand mining
CT	y-pedestrian corridors	no	y- bird nesting habitat	y-dune reshape
DE	y-dune cross-crossovers	y-only 4 wheel drive veh.	y-bird nesting sites	y-sand mining
FL	y-boardwalks & dune cross-crossovers	y- 5 counties allow driving on the beach	y- sea turtle nesting sites	no
GU	y-boardwalks	y-no vehicles public bch	y-public conservation areas	y-sand mining, corals
HI	y-natural resource areas	y-only gov't vehicles	y-natural areas/sanctuaries	y-sand mining, corals
LA	no	no	y-bird nesting sites	y-sand scraping, dune reshape
ME	y-boardwalks	y-no new roads, drives parking in V-zones	y-shorebird nesting wildlife habitat areas	y-sand fencing, bn, ss, removal
MD	y-boardwalks	y-no vehicles on beach	y- bird nesting sites	y- sm, erosion control, bn
MA	y-boardwalks	y-local plan for ORVs allowed on beach	y-natural heritage endangered species habitat	y-sand scraping, mining
MI	y-bchfront stairs, bdwalks, trails	y-restricted along 23% coast	y-natural preserves, critical coastal dunes, high erosion areas	y- ss,ds, sand mining
MS	y-boardwalks	y-no vehicles on beach	y-bird nesting sites	y- ss, sm, bn
NH	y-boardwalks	no	y-natural sites	y-mining
NJ	y-boardwalks	y-local restrictions	y-bird nesting sites	y-ss, mining, dune creation
NY	y-boardwalks	y-no driving on vegetation	y-bird nesting fish VFL sites	y- ss, sn, dune creation
NC	y-structural accessways	y-local restrictions	y-100 mi. undisturbed area	y-dune creation, ss, dr
NM	no	no	y-beaches, pristine areas	y-sand mining
OR	y-boardwalks, walkways sidewalks	y-vehicles restricted near habitat areas	y-bird & endangered species habitat areas	y-sand grading, sand dune mgt.
PA	no	no	y-public beach/bluff	no
PR	y-public access restricted in some Districts, Rec.trails,etc.	y-no cross-country vehicles on bathing beaches, some Dist.	y-natural area reserves, SPA endangered species habitat	y-sand, gravel, stone extraction
RI	y-dunewalk-crossover, decks	y-vehicles prohibited on barrier beach, foredunes	y-APRs, CMAs, habitat areas	y-sand mining, dune alteration
SC	y-boardwalks	y-only emergency vehicles	y-sea turtle nesting	y-sm, ss, sr, dune creation
VI	no	no	y-rec.beaches, turtle nesting	y-dredging, sand mining
VA	y-dune cross-crossovers, trials	y-no vehicles in park areas	y-sea turtle nesting sites	y-dune creation/veg, sm
WA	no	y-no driving on beaches	no	y-dune grading, sand mining
WI	no	y-no vehicles in navig. waters	y- 300 areas statewide	y-sand mining
Total	yes no	yes no	yes no	yes no
29	22 7	22 7	28 1	25 4

Key: y- yes n-no sm- sand mining, ss-sand scraping, dr- dune reshaping, bn-beach nourishment, ORV- offroad vehicles, WL- wildlife, SPA- special planning areas., APR- areas of particular concern, CMAs- conservation and Management Areas

Source: State CZM Profiles

## **PERMIT TRACKING AND ENFORCEMENT**

\* 26 coastal states have permit tracking systems. Only 19 have computerized permit tracking systems for habitable structure permits, 20 for shoreline stabilization permits. These permit tracking systems primarily serve as a tool for tracking individual permit status through the permit system and do not contain detailed information on the type or size of project, location and impact on natural resources, or other relevant data for determining individual or cumulative impacts of permit decisions. However, a few states have begun to explore ways to add such data to their permit tracking systems.

\* 23 coastal states have permit compliance programs usually with field inspections, some with aerial surveillance.

\* Figure 7 identifies which states have computerized or paper permit tracking systems and summarizes each CMP's coastal permit compliance mechanisms.

Figure 7: State Coastal Permit Tracking Systems and Permit Compliance Tools

<b>STATE</b>	<b>Permit Tracking System Permit Compliance Tools</b>
AL	y-computer listing of permit number, subdivision lot, and party name y-post-permit monitoring
AK	y-agency review, inspection, monitoring y- pre-issuance field inspections, post-issuance field inspections, agency project reviews
AS	y- permit database for Land Use Permits since 1984. Covers all permits island-wide, not coded by geographic area (shoreline, steep slope) or resource area (beach, cliff). Sam with Building Permit data.
CA	y-paper files. For CCC permits, developing statewide electronic logging system. y-cease and desist order for activity without permit or inconsistent with permit conditions. Penalties. Reported violations inspected by district office field staff and public records.
CT	y- DEP monitoring of municipal Site Plan Review decisions through quarterly reports y-periodic aerial photo surveys at 5 year intervals, MSPR permits monitored through third party complaints, DER field enforcement staff investigations, clipping service, hearing notices at local level.
DE	y- computer tracking system y- small permit compliance staff make phone calls and inspections
FL	y- computerized database, DEP sends area inspectors to monitor areas y- violations reported, inspector informed, inspector surveys and files report with DEP Bureau of beaches and Coastal Systems, Bureau reviews reports and set penalties/fines.
GU	y- no on-going computer tracking system. Database developed for actions from 1987-1993 only. y- no Territory-wide permit data base dating back to 1979. All permit data is island-wide since Guam's upland jurisdiction is the entire island. This makes it impossible to identify and separate out shoreline development permits from inland development. A database was developed for TLUC actions 1987-1993.

Figure 7: State Coastal Permit Tracking Systems and Permit Compliance Tools (continued)

STATE	Permit Tracking System Permit Compliance Tools
HI	y- 1994 CZM Program computer system and software training for county staff. Database for Kauai County Planning to track permits and violations. City and County of Honolulu utility program that down downloads for CZM data analysis, permit tracking. y- monitoring notices of state and county permit actions for compliance with HCZMP.
LA	n- no computer tracking system y- violations monitored through coordination between Enforcement Section and field investigators
ME	y- NRPA computerized permit file. y- Under NRPA, DER staff, & DMR marine patrol officers jointly enforce and monitor for permit violations. Under MSZA, Code Enforcement Officers notify in writing violations and investigate complaints, submit Biennial reports to DEP on applications, permits approved, variances, violations, etc.
MD	y- joint state and USACE permit tracking system used. Permit and compliance database maintained. y- MDNR, Inspections and Compliance Program monitors authorized projects. Regional inspections. Significant violations corrected through restoration and/or fines after referral to the state AG office.
MA	y- computerized tracking system y- certificates of compliance required for all permitted projects and it must be registered with the deed. DEP takes enforcement actions against state-issued permits. Local conservation commissions are generally responsible for enforcement of locally-issued permits.
MI	y- Coastal and Inland Waters Permit tracking System y- inspection, enforcement, and handling of public complaints.
NH	y-new GIS system in 1995. Prior to that old GIS system very limited, mostly paper files y- 2 wetland Board inspectors serve 17 coastal communities, field inspections, public education. Periodic aerial surveillance to monitor waterfront properties, dunes restoration projects, harbor dredging.
NJ	y- computer database, inspectors, monitoring y- Coastal Enforcement Unit/monthly meetings on enforcement, violations, pending decisions, bulletins, press releases of enforcement actions, monthly reports of over flight inspections, responses to complaints of violations, field inspections, etc.
NY	y- computerized data y- specific application requirements
NC	y- permit application tracking system and separate GPS/GIS base system y- inspection, monitoring, tracking, database within permit and enforcement section.
NM	y- paper files, computer database being developed y- field staff inspections, monitoring permit compliance, cease and desist orders, civil fines.
OR	y- no statewide database on local permits; separate computer permit tracking for OPI-PRD and R/F-DSL permits, but no information on length of shoreline stabilizations (in paper files)

Figure 7: State Coastal Permit Tracking Systems and Permit Compliance Tools (continued)

STATE	Permit Tracking System Permit Compliance Tools
PA	y- permit tracking system for shoreline stabilizations but only since 1994. no surveillance system. permit data for bluff setback permits in written reports only. y- Shoreline stabilizations -site inspections, violations taken to court, complaint response, penalties. bluff permits- Township Code enforcement officers monitor for violations.
PF	n- no permit tracking system, but developing a GIS based computer system y- each regulatory agency has authority to issue compliance, cease/desist orders, impose fines.
RI	y-computerized permit database begun in 1987, upgraded and input permit data back to 1971. y- violation fines/fees, newspapers publish CRMC list of violators, follow-up on every cease/desist order and notice of violation, field staff, condition on CRMC Assent permits.
SC	y- computer tracking system begun in 1980s on D-base. Permit name and #, category of activity, when issued, appeal date. y- routine inspections, aerial surveillance, Creek and Bay Watch citizens reporting program with 800-number, enforcement manual.
VI	y- all paper files, no computerized data base. y- Bureau of Enforcement monitors enforcement. CCA Commissioner may issue cease and desist orders and initiate judicial proceedings with AG office.
VA	y- computerized tracking system. y- certificates of compliance, must be registered with deed. DEP enforces state-issued permits. Local conservation commissioner responsible for local permits.
WA	y- In process of refining and expanding permit tracking database system. y- State DOE review authority over local shoreline substantial development permits; enforcement authority over local government actions.
WI	y- computerized permit tracking system links DNR offices throughout the state. Non-computerized tracking system for federal consistency. y- monitoring is a goal of DNR, no specific permit compliance tools.
Total:	26 States with Permit Tracking Systems 28 States with Permit Compliance Tools 1 State with no Permit Tracking and Permit Compliance Tools: MS
Key: y- yes n-no	
Source: State CZM profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores	

## KEY ROLE OF STATE CZM IN PLANNING

Since passage of the 1972 CZMA, several states have adopted legislation mandating state and local comprehensive planning and/or growth management programs. Some mandatory local planning programs have been incorporated into state CZM Programs, others have not. In addition, state coastal programs have funded numerous planning studies which look at resource protection issues. These eventually lead to adoption of enforceable policies and regulatory programs addressing a wide array of state-wide and area-specific issues such as erosion hazard management and habitat protection.

Planning programs, when combined with implementation through local land use regulations, zoning and subdivision ordinances and other actions, can provide protection of shoreline resources. The level of protection provided varies depending on: the extent of the resource covered by the plan, the type of protection policies, standards and provisions; and the specified exemptions and variances. There was insufficient resources, as part of this project, to conduct an analysis of the key provisions of each local and state CZM plan affecting resource protection. Attention was given instead to reviewing key provisions of regulatory programs resulting from CMP planning and collecting on-the-ground outcome data for which there proved to be very little.

\* State CMPs employ various types of plans including general land use planning or comprehensive planning as well as special area planning such as beach, inlet, bluff, rocky shore, natural reserves, habitat conservation, erosion or hazard area management planning. All but one of the 29 coastal states employ some type of planning affecting their beachfront; 20 rely on local permit delegation in combination with local planning; 23 utilize special area management plans or a variety of other plans; 10 coastal states use more than one planning tool. (See Figure 8)

Figure 8: Planning Tools- local permit delegation, local planning, other plans affecting protection of beaches, dunes, bluffs, rocky shores

State	Local Permit Delegation	Local Planning	Other Plans (SAMPS, etc)
AL	no	voluntary	no
AK	yes	mandatory	Areas of Special Merit
AS	no	no	Territory-Wide Zoning serves as land use plan
CA	yes	mandatory	Coastal resource/environmentally sensitive areas; Local blufftop management plan
CT	yes	voluntary	no
DE	no	no	no
FL	yes	mandatory	Beach Erosion Control Program; Inlet Management Plans
GU	yes	no	Seashore Reserve Plan; Flood Hazard APC; Erosion Control Plan; Recreation & Water Use Management Plan
HI	yes	mandatory	Natural Area Reserves; Marine Life Conservation Districts; Wildlife Sanctuaries.
LA	yes	voluntary	Mash Management Plan & Beneficial Use of Dredged Material Policy
ME	yes	mandatory	Resource Protection Zones

Figure 8: Planning Tools- local permit delegation, local planning, other plans affecting protection of beaches, dunes, bluffs, rocky shores continued

<u>State</u>	<u>Local Permit Delegation</u>	<u>Local Planning</u>	<u>Other Plans (SAMPS, etc)</u>
MD	yes	mandatory	Beach Erosion Control District Plan
MA	yes	voluntary	Areas of Critical Environmental Concern; Local Beach Mgt. Plans for ORV
MI	yes	no	Sand Dune Protection Act & Shorelands Protection/Mgt. require designation of critical dunes & high erosion areas through local zoning; Soil Erosion & Sediment Control Act
MS	no	voluntary	no
NH	yes	voluntary	Hampton Harbor Inlet Mgt. Plan; Seabrook Beach/Dune Plan
NJ	yes	voluntary	no
NY	yes	no	Local Waterfront Revitalization Plans; Local Coastal Erosion Plan
NC	yes	mandatory	State Beach Mgt; Shore Erosion Response; Inlet Mgt. Plans
NM	no	no	Saipan Lagoon Management Plan; Coastal Hazard APC
OR	yes	mandatory	Territorial Sea Management Plan
PA	y-bluff only	bluff only(v)	Presque Isle Peninsula State Park
PR	yes	no	Natural Reserves; Special Planning Areas; Island of Culebra
RI	no	no	Salt Pond Regions; Pawcatuck River Estuary & Little Narragansett Bay
SC	no	no	State Beachfront Management Plan
VI	no	no	APC Management Plans
VA	yes	voluntary	Northhampton County Sustainable Development Initiative; Erosion & Sediment Control Plan
WA	yes	mandatory	no
WI	yes	no	Carol Beach Plan; 3-year Harbor Plans
<b>Total</b>	<b>20- yes 9- no</b>	<b>10- mandatory 9- voluntary 10- no plans</b>	<b>23- yes 6-no</b>
Key: SAMP- Special Area Management Plan			Source: State CZM profiles

## **ROCKY SHORES PLAN**

\* Oregon is the only coastal state to have developed and implemented, through regulations, a rocky shore plan for its entire coastline. This plan serves as a model for other states with rocky shore resources.

*The Oregon Ocean Plan was adopted in 1992, followed in 1994 by the Territorial Sea Management Plan which covers rocky shores, intertidal areas and ocean resources in an ecosystem management process. The Plan provides an ocean policy framework with management standards to be used in managing the marine resources in Oregon's territorial seas. The Plan includes a Rocky Shores Strategy to protect Oregon's rocky marine habitats while providing people the opportunity to use them. Under the strategy, four classifications of rocky shores are designated to guide agency programs on the ground: They include: 10 "habitat refuges" along 4% of the rocky shore where access is limited; 7 "research reserves" along 7% of the rocky shore where access is discouraged and harvest is limited; 8 "marine gardens" along 10% of the rocky shore which encourage visitors to highly popular areas; and 29 "marine shores" along 79% of the rocky shore which are small areas open to public but not heavily used. In addition, 9 areas have been identified but not yet designated and 7 priority offshore rocks/reefs identified for future study.*

A key aspect is "local site management plans" for rocky shore sites with mandatory policies to address complex site conditions, biological resources, human uses, and agency management concerns. The strategy provides clear policies for all agencies to follow and a process for intergovernmental coordination. Education and public awareness through communications and interpretive programs are crucial parts of the strategy to manage growing usage and impacts on rocky-shore areas.

On-the-ground results of site management plans indicate that four Marine Gardens have been closed to taking of marine invertebrates, clams (except razor clams at Cape Perpetua), and mussel (except single mussels for bait). Pyramid Rock in Rogue Reef, a critical habitat site for Steller sea lions and under increased fishery use, under the plan is closed within 1,000 feet to all fishing activity from May-August. Permit or management conditions have been placed on all rocky shore sites to protect the natural resource values of these areas.

## **BEACH MANAGEMENT PLANS**

\* Florida, North Carolina, South Carolina, Maryland and several other states have state-level beach management or erosion control planning. The key purpose of these planning efforts is to address erosion hazard issues. The plans usually identify areas of high erosion, properties affected, and erosion responses that have historically been undertaken. For most, plan implementation is tied to the coastal regulatory programs and state land management and beach restoration or armoring programs.

\* State CZM programs have become increasingly involved in identifying the problems of eroding beach/dune systems and developing coordinated responses through statewide beach management and erosion control plans. States' concerns about adverse affects on downdrift beaches from federal dredging of navigation channels, offshore disposal of dredged materials, and loss of recreational beaches from shoreline armoring, have led state CMPs to take a proactive role in shaping state and federal policies and programs.

*Coastal States Address Causes of Beach Erosion. The South Carolina CMP pushed for Congressional recognition that USACE dredging of Charleston Harbor was causing severe beach erosion on the sand-starved downdrift beaches; this led to the Folly Beach renourishment mitigation project. The State of Florida passed legislation requiring that suitable beach quality sand from inlet and navigational channel dredging be placed on the down-drift beaches; the state then used federal consistency and state-funds to negotiate with the USACE to place 1.4 million cubic yards of sand from St. Mary's inlet dredging on the down-drift beaches rather than losing the sand to the offshore system. After planning and debating the issue, certain states have passed legislation limiting the use of new shoreline stabilizations, in an effort to protect beach and dune systems at the expense of private upland properties.*



## **BLUFF PLANS**

\* California, Oregon and Washington states require local plans that address development along eroding coastal bluffs. These programs are all implemented through state and local regulatory programs. Pennsylvania requires local governments to implement state established bluff setbacks, but this is not considered a planning program.

## **LOCAL COASTAL PLANS**

\* 19 coastal states employ local planning, 10 with mandatory local planning and 9 with voluntary local planning; 10 states do not use local planning. Locally-delegated permitting responsibility combined with mandatory local planning are key management tools employed by Alaska, California, Hawaii, Maine, Maryland, North Carolina, Oregon, and Washington in protecting beaches, dunes, bluffs and rocky shores. Several of the regulatory setback and control zone provisions described earlier are administered by local governments. In states that set the enforceable regulatory guidelines, local implementation is strictly administration of the regulation rather than local planning.

*The California Coastal Program requires Local Coastal Programs (LCPs) with CCC certification and oversight. LCP Regulations require that each local coastal program identify specific coastal resources, hazard areas, coastal access, use priorities and significant cumulative impacts on coastal resources and access of development; and adopt a land use plan, zoning ordinances and zoning district maps to reflect the level and pattern of development consistent with Policies in Chapter 3 of CC Act. Land use plans are required to incorporate resource protection policies. Zoning ordinance are required to their implement land use policy plan. CCC Certification of a LCP results in delegation of coastal development permit authority.*

*There are a total of 73 LCP jurisdictions which have been divided into 126 LCP segments for planning purposes, of which 88 have CCC-certified Programs (Plans and Implementation) and local permit delegation responsibilities. Certified LCPs regarding oceanfront property and its development vary widely. Some encourage purchase of remaining undeveloped properties and impose rigorous guidelines for any new development. Others encourage shoreline development adjacent to coastal erosion areas. 24 coastal jurisdictions recognize coastal geologic hazards through designation of special zones, geologic hazard ordinances, or comparable techniques. 18 jurisdictions use liability releases for projects proposed in hazardous areas. Regarding bluff-top development, some local jurisdictions use predetermined, fixed setbacks that vary from 10 to 320 feet. Others employ a cliff retreat rate, most commonly over a 50-year period. Most communities compromise safe setback considerations in "infilling" areas. The lack of state guidelines for safe beach-level development has led to continued development and reconstruction in hazardous locations. San Mateo has a combined Open Space and Conservation Elements which is implemented by a Resources Management District Ordinance that covers the Coastal Policy requirements.*

*The CCC Interpretive Guidelines (adopted May 3, 1997) address "Geologic Stability of Blufftop Development." These guidelines specify that alternation of cliffs and blufftops, faces, or bases by excavation or other means should be minimized and that cliff retaining walls should be allowed only to stabilize slopes, or seawalls at the toe of the seacliffs or to check marine erosion where no less environmentally-damaging alternative exists and where necessary to: 1) to maintain public recreational areas or public services such as highways, energy facilities, port areas; 2) protect principal structures in existing developments that are in danger of erosion; or 3) in LA, Orange and San Diego Counties, infilling small section of wall in subdivisions where wall already in place and infilling have no substantial adverse effect. The guidelines call for a geologic investigation and report when a development is proposed in an unstable "area of demonstration of stability". In areas of geologic hazard, the Commission may require that a development permit not be issued without a waiver of all claims against the public for future liability or damage resulting from permission to build. All such waivers should be recorded with the County recorder's office.*

## **SAMP PLANS**



\* The 23 states that use SAMPs and other specialized plans employ them to address a variety of issues. Most are used for natural resource area protection. Other uses include flood hazard management, erosion control, resolving recreation use conflicts, economic development, state land management, and multi-issue management. These plans are used to supplement or supersede state coastal regulatory provisions for selected planning areas.

**The Guam Coastal Management Program developed and adopted the Recreational Water Use Management Plan in 1990-1991.** The plan covers a 6 miles stretch along the coast and in the water. It addresses user conflicts along this stretch of beach and water. Bird nesting areas are identified and protected, and Manahac fish-runs protected. The plan prohibits jet skis except in management plan areas. The plan provides for "use zones" for certain water activities in planned areas, and requires buoyed areas for jet-ski-type vehicles and mechanized vehicular closure during predictable Manahac runs. Minimum operating age is 16 years for all mechanized water vehicles. Jet skis can only be operated in planned areas-- two such areas have been adopted, and a third area being finalized. The first area planned, Agana Bay to Piti, encompasses 6 linear miles of coast to a distance varying from two hundred yards to half a mile. The second area, Cocos Lagoon, is a triangular shaped lagoon 3 miles long on the land side, extending 2 miles seaward. The third area is Apra Harbor, which is Guam's commercial port, the Navy port and Guam's Harbor of Refuge.

**The Rhode Island Coastal Program adopted four SAMPs**, as a supplement to the regulatory program for specific areas: Two SAMPs cover oceanfront areas. The main focus of SAMP planning in Rhode Island has been on cumulative and secondary impacts of development in, and adjacent to, poorly flushed estuaries, nonpoint source pollution, groundwater contamination, and on-site sewage disposal systems. The Salt Pond Regions SAMP: Ninigret to Point Judith Ponds covers 32 square miles. Just over 11% was in public ownership and 50% undeveloped as of 1984. The shoreline miles and miles in beaches and rocky shores are unknown, but the Rhode Island Coastal Resources Management Program is developing a GIS data base and will be able to provide this data in future. The SAMP expands the inland boundary to include a watershed; establishes coordinated permit review procedure; amends policies for dredging in Ninigret and Green Hill Ponds to allow dredging in Type 2 waters; and changes water use designations for Port of Galilee to allow port expansion. It also specifies dredging of navigational channels and restoration of overwash channels, and requires disposal of sand dredged materials to replenish the following adjacent beaches: Sand Hill Cove, East Mantunuck; Charlestown Beach; Quonochontaug barrier beach. It prohibits, for beach restoration, mechanical removal or redistribution of sand from the intertidal zone of the beach to increase the profile of the beach scarp or to construct artificial dune since they destabilize beaches, increase erosion along beaches and sedimentation in ponds. It specifies how beach sand shall be placed on beach. It identifies priority areas for acquisition. The SAMP plan sets density limitations for "self-sustaining lands" and "lands of critical concern." Subdivisions in these areas cannot exceed more than 1 residential unit per two acres and sewers are prohibited. The goal is to keep residential development low. The percent of area and shoreline miles covered under these two classifications is not available, but RICRMP is developing a GIS system that should be able to provide this information in the future. Also, the plan is under revision. (Source: RI Salt Pond Region SAMP, 1984, and 1993 Addendum and phone interview with Jeff Willis, RI Coastal Program Manager)

## KEY ROLE OF STATE CZM IN PUBLIC LAND MANAGEMENT AND ACQUISITION

Regarding public land management, most of the state beachfront and oceanfront parks had been acquired and placed under state park management prior to enactment of state CZM program. The unique role of the state coastal program has included funding or promotion of detailed resource inventories and specialized management plans to balance resource protection and public use of these sensitive lands; installation of boardwalks over dunes and other sensitive habitat; sand fencing to avoid dune destruction; walking trails to limit damage to park resources; beach profiles, sand transport and erosion studies, and beach management planning; beach and dune restoration; and policies limiting state infrastructure investments on state beachfront park shorelines. Beach renourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beach through shoreline hardening. Likewise, some states have funded research into sand loss from inlet dredging and have demanded that beach quality sand be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CZM programs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

Although many state land acquisition programs were in existence prior to enactment of state CZM programs, some state CZM programs have played a major role in creating new land acquisition programs and in helping their state set priorities for coastal land acquisitions. State CZM programs have funded land inventories, land appraisals, negotiated purchases and land swaps. Land inventories have included both high value natural resource properties and vacant coastal lands suitable for recreation. State CZM programs have served as advocates for state acquisition of oceanfront and shoreline properties.

States that are effective stewards of their shoreline parks and preserve lands use park inventories and management plans; install boardwalks, dune crossovers or other guided pedestrian access; use dune restoration and beach nourishment where appropriate; enforce policies restricting the use of shoreline stabilization structures; designate natural resource habitat protection areas; and acquire additional holdings.

### ACTIVE MANAGEMENT OF STATE COASTAL LANDS ◆

\* State ownership and management of state-held lands along the coast can afford a high level of natural resource protection, subject to competing use demands placed on such lands. State lands developed for recreational use, such as beachfront parks, can also protect natural resources if management plans are adopted and implemented which restrict pedestrian and vehicular access, set aside fragile habitat from human use, and employ other methods to maintain the natural landforms. Protection also varies depending on priority uses given to such state holdings. Those lands with wildlife preserves or conservation areas generally afford more restrictions on uses than state parks and recreation areas.

\* The installation of boardwalks and dune crossovers serves to protect natural dunes through stabilization of dune vegetation and avoidance of dune breaching. Dune creation and restoration through sand fencing and dune revegetation serve to stabilize and rebuild dune areas, limit breaching during coastal storms, and recreate natural dune systems.

\* The identification, designation and protection of natural resource areas within beach/dune systems function to sustain the natural habitat conditions and values present and provide long-term protection. However, to the extent that such protection is only seasonal, such as temporary turtle or bird nesting site fencing, pedestrian access over such areas at other times of year may destroy the habitat values long-term.

\* All 29 coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore; 26 have natural resource protection areas and guided accessways, and 21 states have acquired additional coastal lands.

\* Only 17 states have inventory data on their state coastal land holdings such as number of shoreline miles in state parks. The data gaps regarding state coastal parks and state beachfront parklands is discussed under the outcome data section that follows. 5 states do not have information on the total number of beach miles. 5 do

not know the number of state coastal parks. 10 do not know the number of beachfront coastal parks they own. 12 do not have information on the miles of state coastal parklands they own. 11 do not know the number of miles in state coastal lands. See Figure 9-A.

\* 14 states use boardwalks or dune crossovers within their state coastal parks to guide pedestrian traffic over fragile beach and dune resources. Sand fences have been installed to keep pedestrians off the beach. Prior to CZM, unguided access resulted in the trampling of many public beachfront dune areas.

\* 13 coastal states employ dune creation on state beachfront parks to repair and enhance the natural functions of their state-owned beach and dune systems.

## **BEACH NOURISHMENT** ◆

\* Beach renourishment has become popular as a tool to artificially create or recreate a beach area through the importing of compatible sand. The position of NOAA is that "...while beach nourishment may indeed, under certain circumstances, be a technically viable alternative, there are many other considerations that must be deliberated prior to supporting this approach to erosion management... include(ing) the role of beach nourishment in inducing development in high hazard areas, ....other erosion management approaches; whether beach nourishment is economically justified, appropriate cost-sharing, and the environmental issues..." (MEMO March 19, 1996. NOAA Position on the National Academy of Sciences' Report "Beach Nourishment and Protection.") For this study, if a state employs beach nourishment in lieu of armoring with sufficient documentation of benefits and tradeoffs, it is generally considered a positive impact on protecting natural beach/dune systems. However, the author agrees that unconditioned use of beach nourishment may indeed adversely affect natural systems and may not be the most suitable management approach to protect natural beach/dune areas.

\* 17 coastal states have used beach nourishment or renourishment as a management tool, 15 in conjunction with the USACE. See Figure 9-B. Historically, the lead agency in beach renourishment has been the USACE with local governments participating as project sponsoring. With increased state regulatory oversight and the federal consistency provisions of the CZMA, beginning in the 1970s, coastal states have taken a more active role in setting policies and priorities for beach nourishment.

\* With the increased use and cost of beach nourishment, states in addition to local government have been called upon to provide matching funds for projects. The state and local share is usually 20% of the total cost of a project. There is insufficient data to determine the number of miles of beachfront or cubic yards of sand placed in state-funded beach renourishment projects. Table 3 in Appendix A provides data on USACE major shore protection projects in CZM states between 1950 and 1993. Most states appropriate money from the legislature as needed to match USACE beach nourishment projects. Only a few states, like Florida and South Carolina, have begun to take a proactive role in setting state priorities for beach nourishment projects and seeking dedicated funding for beach nourishment.

\* There were insufficient resources to conduct an in-depth study of state-sponsored beach nourishment projects. Furthermore, state data was sparse on projects funded, success or failure of such projects, and tradeoffs made in selecting beach nourishment as the appropriate management response.

## **SHORELINE ARMORING** ◆

\* Most of our nation's urban waterfronts have been armored. Shoreline armoring is a practice which began prior to CZM programs, in an effort to protect private oceanfront structures and public infrastructure from erosion. Greater awareness of the negative impacts of shoreline stabilization structures on adjacent properties and coastal resources has caused CMPs to more closely scrutinize such activities and weigh the private and public benefits. This is particularly the case, along public recreational beaches, where armoring to protect roads and

public access to the shoreline results in the loss of natural beach. Armoring and armoring repair through construction of shoreline stabilization structures acts to accelerate the loss of sandy beaches. For this study, if a state employs armoring on state beaches, it is considered a negative impact on natural beach/dune systems.

\* 11 coastal states have funded armoring or repair existing armoring structures in high erosion areas along their coastline. 15 states have had federal USACE shoreline protection projects built along their coastlines. In all cases, these armoring project were built to protect existing upland infrastructure such as roads, public accessways or public buildings inappropriately sited along the eroding coastline. The cost of relocation such existing uses, particularly coastal highways, was weighed against the loss of natural recreational beaches and armoring was selected as the management option of choice.

#### **STATE COASTAL LAND ACQUISITION** ◆

\* Acquisition programs place private lands into public holdings. Along the coast, these acquisitions tend to serve both recreational use demands and some resource protection goals. Acquisition of large resource systems, or acquisition of lands adjacent to existing holdings can afford improved natural resource protection opportunities.

\* 21 coastal states are utilizing acquisition to purchase additional valuable coastal resources. Data is not generally available on all state land acquisitions, so it was not possible to determine whether coastal land acquisition was a priority over inland acquisitions. Although some states do not have formal land acquisition programs, they have utilized CZM funds and other funds to acquire significant parcels.

***A full range of state coastal land management activities occur along New Hampshire's 18 miles of highly developed oceanfront where the immediate shoreline is mainly (78%) in public ownership. State coastal park management plans have been completed for several of the 9 beachfront parks and 7 rocky shore parks in state ownership including studies of archeological, historical, recreational, and natural resources. Twenty (20) natural resource inventories funded by CZM provide baseline data on habitat areas and are used in permitting by Wetlands Board and in public education programs. The Seabrook Back Dunes, the only major undeveloped back dunes remaining along the New Hampshire coast, was acquired by the Town of Seabrook with partial funding (\$100,000) from the CZM Program. This 53 acre parcel is managed as a conservation and passive recreation area. CZM funded an Education Brochure Trail Guide to the Seabrook Dunes Area (1985), Coastal Endangered Plant Inventory on Seabrook Dunes (1983), Seabrook Dune Management Plan (1985), Dunes Valuation Analysis and Acquisition Report 1984, and Final Appraisal (1986). The state also acquired other parcels to expand their coastal land holdings for recreation and conservation. New Hampshire has completed a multi-year Seabrook Foredunes Restoration Project on a 15 acre town-owned Seabrook Beach. The project involved restoring badly eroded dunes, the planting of American beach grass to stabilize the dunes, and the construction of walkways from the street to the beach to control access and minimize adverse impacts on dunes. Signs along walkways inform the public about dunes restoration work and the importance of using walkways. Route 1-A borders the ocean along most of the coastline. The state periodically repairs and maintains protective seawalls running between the beach and the road, as well as seawalls protecting state beachfront parking lots.. Two USACE-built harbor jetties are maintained and as is the state-built jetty at Hampton Harbor Inlet. New Hampshire periodically dredges its harbor channels and beach-quality sand has been placed on adjacent beaches. The USACE also periodically dredges the Hampton Harbor entrance channel, but the sand is not always used for beach nourishment***

***Nearly half (47%) of California's 1100 mile long coastline is in public ownership and active public management. The State Department of Parks and Recreation (DPR) is one of the largest landowners along the California coast, with over 375 miles or 34% of the ocean shoreline in the state parks system. There are ~ 87 bluff-front state parks and ~32 rocky shore state parks. Management of these parks is a major activity, some of which are located in coastal hazard areas. About 10% of state-owned park units are administered by local governments. The state parks include reserves, beaches, historic parks, and unclassified units. They cover beaches, dunes, bluffs, rocky shores and some underwater state reserves. The state has installed ~20 boardwalks to guide pedestrian traffic. The DPR acquisition program for beaches and dunes, through special site-specific legislation and some bond-funds, has acquired 26,838 acres of state beaches, ~6,000 acres of***

unclassified beach areas, 27.3 miles of land in five state parks and one state reserve, and 2.8 miles of dunes. California has also acquired bluff and rocky shore areas through special legislation and surplus property bills, but the amount of shore acquired above mean high tide is unknown.

The Coastal Conservancy awards grants to local governments and non-profit organizations for coastal restoration and coastal resources enhancement projects. Funds are also used for Resource Protection Zones, buffer areas surrounding public beaches, parks, natural areas and fish and wildlife preserves in the coastal zone. Between 1978-1995, 600 projects were initiated and 400 projects were completed involving access, wetlands protection, trail, recreational pier restoration, conflict resolution and farm lands protection. Between 1978-1992, \$175 million general obligation bonds acquired 29,000 acres.

The California Department of Parks and Recreation (DPR) administers a statewide resource management, stewardship, and donor program which includes dune creation/ restoration. Through this program 9 dune areas were revegetated on state lands.

The California Department of Boating and Waterways (DBW) administers a "shoreline erosion fund" which provides funds to state agencies and local governments for construction of shoreline protective devices and beach nourishment on public beaches and park lands with 75% state funding and 25% local match funding. Nineteen (19) beach erosion control projects were funded between 1980-1996. Since 1980, there has been approximately 20 miles of beachfront replenished, restored, or renourished with 15 million yards with joint federal/state/local funding. Several properties have seawalls with a well-documented history of repeated destruction and reconstruction. In 1984, the DPR adopted a coastal erosion policy to discourage armoring in state beachfront parks and to avoid construction of new permanent facilities in areas subject to coastal erosion and to promote use of expendable or movable facilities in areas subject to erosion. However, the DPR rebuilt a timber seawall for seventh time with little design modifications. This armoring to protect a parking lot and access is not typical.

Figure 9-A: STATE COASTAL LAND HOLDINGS AND ACQUISITIONS

State	Beach Miles	State Coastal Parks # Parks # Beach Parks	State Coastal Parks Mi Parks Mi.BchP	State C. Parks Acres Park Acres Beach	Coastal Lands Acquired (acres/miles)
AL	46	1 all beach	3 all beach	6,000 all beach	n
AK	nd	63 nd	nd nd	990,335 nd	n
AS	nd	nd nd	nd nd	nd nd	n
CA	nd	119 71	377 280	145,540 26,838	B/D: 26,838 acre; BL: yes-nd; RS: yes-nd
CT	78.6 (?)	nd 6	nd 6.75	nd 3003	B/D: 1,439 acre
DE	24.5	3 all beach	18	nd nd	B/D: yes- nd
FL	825 343.4-P? 41.5%- Public	24	~500	~11,500	B/D: parcels: 980 acres: 294,968 miles: nd
GU	40	14 (only beach)	5.1 13%	nd nd	yes through trades -nd
HI	185	24 16	16%	14,814 322	62 acres-B, BL, RS combined
LA	>4 mi d/n inc. barrier island shore	2	unk >1 mi.	unk 345	n
ME	23 B/D 20%-S 205 RS	25 10	nd 4.6	11090 2380	B/D & BL & RS properties: 8 acrs: 4828 miles: ~20
MD	32	3	17	nd all beach	parels:2 acres: nd miles: 2
MA	222	18 nd	64 nd	nd nd	State Acres:2250 miles: nd Local Grants Projects: 17 Acres: 273 miles: nd
MI	270 50%-S	29 nd	114 nd	nd nd	136,000 statewide coastal: nd
MS	18	1	nd	nd	n
NH	10 B/D 7.8 RS	16 9	12.5 10	~580 101	B/D & RS acres: 131 Miles: nd

Key: B/D- Beach/Dune BL- Bluff RS- Rocky Shore CA- Coastal Area y- yes n- no ?-nd- unknown, no data provided.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

\* CZM Profile coastline miles data differs from General Coastline mile data in U.S. Department of Commerce, NOAA 1975. *The Coastline of the United States*.

\*\*US Army Corps of Engineers, *Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection projects of the U.S. Army Corps of Engineers*.

Figure 9-A: STATE COASTAL LAND HOLDINGS AND ACQUISITIONS Continued

State	Beach Miles	State Coastal Parks # Parks # Beach Parks	State Coastal Parks Mi Parks Mi.BchP	State C. Parks Acres Park Acres Beach	Coastal Lands Acquired (acres/miles)
NJ	125 9% state	2	12	3192	n
NY	125 30%-s	10 all beach	46.5 all beach	11,600 all beach	CA:2000 acres
NY	No	Data	Great	Lakes	see above
NC	320 5%-S?	3	11 3.4%?	nd	7,000 acres beachfront 27,439 beach access sites
NM	nd	nd nd	nd nd	nd nd	n
OR	262 B/D 56%-P 30%-S 100 RS 65%-P 53%-S	64 nd	129.5 76.3-B/D 53.2-RS	27,107 nd	B/D & RS acres: 94.3 miles: .75 B/D only
PA	Lake Erie 10-B 99%-S 53-BL 11%-P 10%-S	Lake Erie 2 1	Lake Erie 13.4 9.9 B 3.5 BL (5.3?)	Lake Erie 3110 10 B 3100 BL	B/D: Spoil Island mile: .25 acres: 10 BL: mile: 3.5 acres:3,100
PR	154	nd 15	nd nd	nd nd	n
RI	27.3 64%-S	14 nd	nd nd	1501 nd	y-nd
SC	181	4	68	nd	y-nd
VI	nd	nd nd	nd nd	nd nd	n
VA	200 10%-S	1	6	4700	y-nd
WA	60 B 111 RS	120 nd	nd nd	27,000 nd	75,000 acres statewide coastal: >10,748 acres
WI	820 10%-B 72%-BL 8%-RS	30 nd	nd nd	nd nd	637 acres: 77 beach/560 dunes
Total	y-29 nd-5	nd-5 nd-10	nd-12 nd-11	nd-15 nd-16	y-20 n-9

Key: B/D- Beach/Dune BL- Bluff RS- Rocky Shore CA- Coastal Area y- yes n- no ?-nd- unknown, no data provided.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

\* CZM Profile coastline miles data differs from General Coastline mile data in U.S. Department of Commerce, NOAA 1975. *The Coastline of the United States*.

\*\*US Army Corps of Engineers, *Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection projects of the U.S. Army Corps of Engineers*.



Figure 9-B Active State Coastal Land Management

State	Board-Walks- # Dune Cross- Overs- #	Dunes Revegetated # projects feet & mile	Beaches Renourished # Projects Federal ** State (# & Mi)	Armoring Projects Federal ** State	Natural Protection Areas
AL	y-7	y-1 500ft	n n	n n	40 acres for Perdido beach mouse; ~3 mi. sea turtles nesting season; 25 acres for terns.
AK	n	n	n n	n n	49,000 acres protected for Bald Eagles
AS	n	n	n n	n n	n
CA	y-~20	y->19 nd	y-7 y-nd	y-5 y-12	Resource Mgt. Plans designate trails, roads, parking, zone units for reserves, preserves, habitat protection and public use. Endangered species habitat protected bird nesting sites.
CT	?-nd	9 nd	y-6 y-1 .25 mi	y-2 y-3	408 acres Natural Area Preserve; 806 acres Coastal Reserve; Nature trail
DE	y-2-bdwb y-3-cross	y-nd 6 mi ?	y-2 y-nd 6 mi.	y-1 n	Endangered species habitat-such as piping plover-case by-case and during nesting season.
FL	y-many nd	y-100 mi	y-26 y-nd ~94 mi.	y-6 y-nd	Sea turtle nesting sites during season.
GU	n	n	n n	n n	28,197 acres (20.73% Guam total land area) 15,600 acres submerged lands.
HI	n	n	n n	n n	y- Natural Area Reserves, Wildlife Sanctuaries, Marine Life Conservation District
LA	y-1	y-6 ~20 mi barrier Is.	y-2 y-nd ~20 mi.	y-1 y-20	n
ME	y-1%	y-5 4 mi.	n y-6 USACE Harbor Proj. >1 mi	n n	3 state beachfront parks, dunes protection, pedestrian accessways; sea bird nesting sites fenced off during nesting season. 1 Rocky Island Sanctuary-access restricted
MD	y-1	y-1 2 mi	y-2 y-2 10 mi.	y-1 y-nd	Seasonal restrictions for nesting birds along entire beachfront.
MA	?-nd	y-nd	y-5 y-nd 3 mi.	y-2 y-nd	5 coastal pk. mgt. plans for 4,673 acres 14 ACECs covering 75,000 acres.
MI	?-nd	n	n n	n n	- 860 mi total: ~250 mi. natural preserv; ~300 mi. critical dunes areas; ~310 mi. high risk erosion areas.
MS	y-1	n	y-2 y-1 18 mi.	y-1 n	n
NH	1	y-2 nd	y-3 y-5 2 mi.	y-2 y-3	Pedestrian access restricted area; 5 acres. piping plover nesting site.
NJ	n	n	yes-8 y 27 mi	y-4 y ...	B/D acres: 2,500 miles: 11.57 Included 100 acre bird sanctuary; 1200 acres beach research/wildlife sanctuary; 1,000 acre beach nature area; 3 other nature areas 1201 acres.

Key: y- yes n- no ?-nd- unknown, no data provided.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

\* CZM Profile coastline miles data differs from General Coastline mile data in U.S. Department of Commerce, NOAA 1975. *The Coastline of the United States*.

\*\*US Army Corps of Engineers, *Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection projects of the U.S. Army Corps of Engineers*.

Figure 9-B Active State Coastal Land Management (Continued)

State	Board-Walks-# Dune Cross- Overs-#	Dunes Reveg. # projects feet & mile	Beach Nourishment # Projects Federal** State # & MI	Armoring Projects Federal ** State	Natural Protection Areas
NY	3	n	y-8 y-1	y-4 n	7 protection areas covering 566 acres in state parks. >50 miles beachfront bird nesting areas. 200 fish/wildlife habitat areas.
NC	2	y-nd	y-6 y-12 5 mi	y-2 n	314 miles plus spoil islands (?) 100 miles undisturbed Reserves; 50 acre nesting colonial birds; 11 miles sea turtle nesting.
NM	n	n	n nd	n n	Offshore islands as bird sanctuaries, beaches as turtle nesting sites
OR	n	n	n y-1 >1 mi.	n n	Vehicles prohibited on 70% of coastline. State park mgt. trails, restricted access.
PA	n	n	y-2 y- 1 area 6 mi	y-1 y-1	Lake Erie only n- beach y- D. Roderick Wildlife Refuge
PR	n	n	n n	n n	19 Nature Reserves and 8 Special Planning Areas
RI	y-1	n	n n	y-1 n	All undeveloped barrier beaches
SC	4	y-3 58 mi	y-1 y-4 45 mi.	y-1 y-nd groins repair	68 miles in parks/wildlife preserves.
VI	n	n	n n	n n	Salt River Bay
VA	n	y	y-1 y-5 nd	n n	6 miles sea turtle nesting at False Cape.
WA	?-nd	n	n n	n n	Many- 7 areas with >6336 acres harbor seals, falcons, eagles and other bird nesting areas.
WI	y-several nd	n	n n	n y?	~300 natural areas statewide coastal: nd
Total	y-14 n-11 ?nd-4	y-13 n-16	fy-15 sy-17	fy-15 sy-11	y-26 n-3

Key: y- yes n- no ?-nd- unknown, no data provided.

Source: State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores.

\* CZM Profile coastline miles data differs from General Coastline mile data in U.S. Department of Commerce, NOAA 1975. *The Coastline of the United States*.

\*\*US Army Corps of Engineers, *Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection projects of the U.S. Army Corps of Engineers*.

## 6 OUTCOME INDICATORS OF EFFECTIVENESS

Outcome indicators are used to measure the on-the-ground effects that result from implementation of CZM tools. **Outcome Indicators** of CZM effectiveness in implementing regulatory, planning, direct land management and acquisition tools associated with the protection of **beaches, dunes, bluffs and rocky shores** include the following:

### **Regulatory Programs Outcomes**

- (a) No further encroachment into coastal resource areas as measured by one or more of the following:
- 1) aerial photography interpretation documenting no new shoreline structures or shoreline stabilizations on the beach/dune system, eroding bluff, coastal floodplain, or immediate shoreline;
  - 2) permit data reflecting few or no permits for activities seaward of setback lines, few or no permits for activities on active beaches/dune systems, eroding bluffs, or coastal hazard areas;
  - 3) permit data which includes area and linear miles of permitted activities by type of activity (new residence, seawall, etc.) located in specific resource areas (beaches, dunes, etc.) within the state's coastal control zones and restrictive conditions attached which shown minimization of adverse impacts (size, location, design other conditions);
  - 4) permit data on demolitions or landward relocation of beachfront/bluff-front structures; and/or
  - 5) physical surveys of the condition of selected natural shoreline resources (dunes, rocky shores, etc.)
- (b) No further hardening of the undeveloped beachfront through shoreline stabilizations as measured by:
- 1) aerial photo interpretation; and/or
  - 2) permit data on linear miles of shoreline stabilizations permitted by type of stabilization.
- (c) Controlled shoreline accessways as measured by:
- 1) aerial photo interpretation or shoreline maps of controlled accessways;
  - 2) permit data on shoreline boardwalks, dune crossover, and other structural accessways permitted with specific resource areas (beach, dune, bluff, rocky shore); and/or
  - maps delineating shoreline acres and miles where pedestrian and/or vehicular access is restricted.
- (d) Healthy and maintained intact natural habitat areas along the coast as measured by:
- 1) aerial photo interpretation;
  - 2) maps delineating habitat protection areas and permit data showing no activities permitted in designated areas which would adversely affect the natural values being protected; and/or
  - 3) periodic physical surveys of designated protection areas.

### **Adopted Plan Outcomes**

- (a) Achievement of Plan Objectives-- such as resource protection, inlet management-- as measured by:
- 1) aerial photo interpretation;
  - 2) periodic physical surveys of areas protected or managed under enforceable plans;
  - 3) state and local permit data on activities permitted within approved plan areas, area and linear miles affected and consistency with plan objectives; and/or
  - 4) state or local actions undertaken-- such as dune revegetation, installation of inlet sand transfer plant-- and results from such actions.

### **State Coastal Land Management and Acquisition Outcomes**

- (a) Presence of state coastal land holdings in parks and preserves containing beaches, dunes, bluffs or rocky shores as measured by acres, linear shoreline miles, coastline in public ownership/state ownership with resources present.
- (b) Active public natural resources stewardship of coastal land holdings as measured by:
- 1) number of accessways, marked trails, boardwalks, dune crossovers and demonstrated public use;
  - 2) dune restoration projects, acres, miles of shoreline involved, state funds;
  - 3) beaches restored/renourished in cubic yards, beachfront miles, state funds;
  - 4) number of shoreline stabilizations installed, acres, shoreline miles affected as a counter-indication to stewardship; and/or
  - 5) acres, shoreline miles in state coastal lands designated as conservation, preservation or protection areas and aerial photo interpretation, periodic physical surveys to verify condition of resources.
- (c) Coastal land acquisition program as measured by the miles and acres and type coastal shoreline resource areas acquired by the state, the state expenditures for coastal versus inland properties, and the CZM program funds used.

## OUTCOME INDICATOR DATA AVAILABILITY ✕

It is not possible to determine on-the-ground outcomes or effectiveness of implementing state CZM regulatory programs, planning programs, state land management, and state acquisition programs to protect beaches, dunes, bluffs and rocky shores, based on data and information provided by OCRM and the coastal states. For the most part, there was insufficient data to assess the on-the-ground effectiveness of state CZM programs. Monitoring and reporting of on-the-ground outcomes of CZM program activities have not been required, as part of OCRM's annual reporting on grants and activities and the periodic 312 program evaluations. Although most states have developed permit tracking systems, these are primarily administrative efforts to track individual permits through the regulatory process and not designed to contain program evaluation data. State reporting on plan implementation, where available, is descriptive rather than analytical. Data on shoreline ownership and inventories of shoreline resources have not been updated since program approval and outcome data on results of active state coastal lands stewardship is scarce.

**Appendix C** contains a summary of the available *outcome data* associated with state regulation through permits for shoreline construction and shoreline stabilizations, restricting access, and protecting habitat. Appendix C also contains summary tables with outcome data associated with state ownership and management and coastal land acquisitions. These tables cover the tools utilized by state CZM programs and available outcome data on program implementation to protect beaches, dunes, bluffs and rocky shores. Findings regarding *outcome indicators of effectiveness for state CZM tools employed to protect beaches, dunes, bluffs and rocky shores* are presented on the following pages.

## REGULATORY OUTCOMES ✕

\*Although 20 of the 29 coastal states have computerized permit tracking systems (19 for habitable structures, 20 for shoreline stabilizations), states do not keep state-wide databases on the linear miles affected or area affected or resources affected by the permits approved for activities along the beachfront or oceanfront. Such information, when available, is contained only in the individual paper permit files. Only 16 states provided any permit data on structures and shoreline stabilizations. States restrict the size, location design of structures and shoreline stabilizations to minimize adverse impacts on natural resources beach/dune systems. Conditions attached to individual permits are sometimes contained in paper files, but never in computer permit tracking systems. Of the 25 states that employ restrictions over activities such as sand mining and beach nourishment, none routinely collect data on the results of these restrictions. Likewise, coastal states do not collect and analyse statewide data on changes in shoreline development or changes to conditions of natural resources from aerial photography or from permitted activities.

\*Regulatory program jurisdictions vary but tend to extend from MHW inland a certain number of feet, a distance based on erosion rates, or to the inland extent of a natural or manmade feature. Within this permit jurisdiction, several or no significant natural resources may be affected by any given permitted activity. No statewide data is available on specific resources affected by approved permits. This data may not even be contained in individual paper permit files. Trend data on changes in number of coastal permits issued and number of violations cited is also insufficient to use in assessing regulatory program effectiveness. Although some states keep data on numbers of coastal permits issued and violations corrected, the critical information missing is a break-down on type of activity permitted, length of project and area of coast and resources affected. Although some states issue permits for demolition or relocation landward of beachfront structures, multi-year data is not readily available. Only Upton-Jones data was available from FEMA. (See Appendix A) For states that delegate coastal permitting to local governments, no state maintains a multi-year database on local permit decisions.

\*23 states restrict pedestrian and/or vehicular access. Several coastal states issue permits for boardwalks and dunes crossovers, but states with large number of boardwalks permits (such as Florida) do not have permit data available. A few states set guidelines but do not require permits if such structures comply with the guidelines, so there are no records on construction of these accessways. Only 4 state provided data on access permits and 3 states on vehicular access permits. Michigan data shows 200-250 public access projects approved between 1989-1995 and vehicular access restrictions along 23% of the coastline. New

Jersey data shows 2 permits for boardwalks between 1994-1996 but no data on local level restrictions of vehicular access. Oregon data shows 12 boardwalks permitted between 1967-1995 and vehicular restriction along 70% of the coastline. South Carolina allows, without permit, small walkways over dunes if guidelines are met. Larger projects require permit. Data shows 12 boardwalks permits issued and 13 emergency vehicular access permits issued between 1988-1995.

\* 27 states protect areas such as endangered species habitat and restrict development in these areas through regulation. Only 9 states provided data on protection areas and even this data was scant and lacked information on the type of resources within protected acreage or condition of resource area. For several states, protection occurs only on state-held lands. Examples of state data collected:

AL- 3 miles of sea turtle nesting; 40 acres of beach mouse habitat; 25 acres of tern nesting habitat.

AK- 49,000 acres of Bald Eagle nesting habitat.

MI- 300 miles of critical dunes; 250 miles of natural preserves; 310 miles of high risk erosion areas.

NJ- 15 miles of bird nesting habitat

NY- 50 miles of beachfront bird nesting sites; 200 designated fish/wildlife habitat areas.

NC- 100 miles of undisturbed areas.

SC- 181 miles beachfront restricted during sea turtle nesting season.

VI- 13 recreational beaches; 9 sea turtle nesting beaches; 13 CRBA areas.

VA- 6 miles of sea turtle nesting sites protected.

#### **Example of outcome data collected:**

As shown in Table 4-A, Rhode Island CRMP tracks permit data by activity type and not by location (beaches, bluffs, rocky shores) so one cannot identify extent of permitted activity by resource area. One cannot make a determination of effectiveness from data provided. As shown on Table 4-B, RICRMP policies prohibit new development on undeveloped and moderately developed barrier beaches. At least 65% of the barrier beaches have had no new permitted development since 1971 or earlier. Likewise no new shoreline stabilizations were permitted on undeveloped and moderately developed barrier beaches since 1971. Permit data in Tables 4-A and 4-B do not reflect setback requirements which act to place development away from shoreline, erosion areas, and valuable habitat areas. Table 4-C indicates no outcome data on pedestrian or vehicular access restrictions. Table 4-D shows several special regulation areas covering setbacks from resource features, erosion setbacks, setbacks from dunes, and areas restricted from development based on adjacency to state waters classified as type 1 and 2.

Table 4-A: State Permit Actions-Rhode Island

REGULATORY ACTION	CRM Council Permit	CRM Council Permit (Assents)
YEARS	1971-1977	1971-July 1996
Upland Jurisdiction	CRM Council(b) CRM Regulatory Jurisdiction (b)	
Permit Applications	~600 (a)	unknown
Permits Approved	~ 97% (a)	14,762-- 95% in Tier 1
Subdivisions		312 (2%)
Dwelling Units		3950 (27%)(c)
Commercial/Indust Dev.		539 (4%)
Maintenance R/C/I		762
Accessory Blds.		1073
Recreation-Pools		208
Dredge/Fill		359
Roads		467
Marina Activities		778
Docks		2504 (17%)
Dock Maintenance		389
Discharge/Waste Fac.		477
Energy facilities		200
Demolitions		30
ISDS*		559
Landscaping		149
Federal Consistency		119
Other (d)		572
Shoreline Stabilizations		1066 (7%) (e)
Nonstructural Shore Proj		238 (1.6%) (f)
Violations Cited		no data
Habitable Structures		
destroyed by storms		no data
permitted to rebuild		no data
denied to rebuild		no data
relocated		3 Claims Approved under Upton Jones for demolition or relocation

Key: \*ISDS- Individual Sewage Disposal Systems

(a) 125 approved in FY1977 only (FEIS, p. iv). Approved after modifications suggested by council/staff to minimize adverse environmental effects. (b) Tier 1 -200 ft. inland of coastal features including beaches, dunes, bluffs, rocky shores and other shoreline feature areas such as wetlands. Tier 2- the inland extent of 7 types of activities. (c) 1715 new, 1703 alterations to DU. (d) Other includes buffer alterations (74), wetlands determinations (38), mosquito Ditches (18), ROW (10), and other (e) Shoreline Stabilization Structures: groins, bulkheads, rip rap, seawalls, retaining walls, and repairs. (f) Cover beach nourishment/conservation restoration activities (224) and non-structural shoreline protection/vegetation (14) Sources: Computer printout, Application Statistics by CRMC Project types, provided by Jeff Willis, August 29, 1996. Also Mark Crowell, Upton-Jones Data Base.

Table 4-B New Development &amp; Shoreline Stabilization Permits by Barrier Beach Designations- Rhode Island

Barrier Type	% of Beach Shore	New Development	Permits 1971-1996
Undeveloped	65%	Prohibited	None(a)
Moderately Developed	(part of 35%)	Prohibited	None(b)
Developed	35%	Allowed	Unknown
Barrier Type	% of Beach Shore	New SS	Permits 1971-1996
Undeveloped	65%	Prohibited	None (c)
Moderately Developed	(part of 35%)	Prohibited	None (c)
Developed	35%	Allowed	Unknown

Note: Total Beach Shore is 27.3 miles

Key: New Development- residential, commercial, industrial development

SS- structural shoreline stabilizations

(a) neither public nor private development since 1954.

(b) no new development allowed.

(c) no new structural shoreline stabilizations allowed

Sources: 309 Assessment, Jeff Willis

Table 4-C: Pedestrian and Vehicular Access Restriction On Private Lands Protecting Habitat Areas- Rhode Island

REGULATORY ACTION
<b>Beachfront Boardwalk Permits 1971-1995:</b> Unknown, no permit required if meet state guidelines.
<b>Vehicular Traffic Restriction Areas as of 1995:</b> Many, no data base.
<b>A. Coastal Beaches and Dunes (210.1):</b>
- vehicles prohibited on dunes except on tails marked expressly for vehicular use.
- vehicular use of beaches (where not otherwise prohibited by private/public management programs) required DEM Use Permit through DEM Division of Enforcement. Vehicles shall not be operated across protected (lifeguard) swimming beaches during protection period.
<b>B. Barrier Beaches (210.2)- Prohibit:</b>
- vehicle access across back barrier flat to access Salt Ponds
- vehicles in vegetated areas anywhere on barrier
<b>C. Dunes (1995 Addendum- New Section 210.7- Dunes)-Prohibit:</b>
1. vehicles on dunes within 75 ft. of dune crest except on marked trails.
2. alteration of foredune zone adjacent to Type 1 and 2 waters, except for protection/restoration, no hard structures.
<b>Habitat Protection Areas as of 1995:</b> Many, no data base.
Source: Jeff Willis, RICRMP Regulations.

Table 4-D Regulated Areas- type of regulated area, acres, shoreline miles, resources protected- Rhode Island

TYPE OF AREA	Acres/Shoreline Miles/Resources Protected or Benefit
<b>A. Coastal Setback</b>	acres-nd Mile- 100% All 700 miles of tidal & 311 miles of coastline setback at least 50 feet and up to 200 feet inland in some areas to protect coastal features.
<b>B. Critical Erosion Areas</b>	Acres-nd Miles-nd No data on percent of total 311 mile of coastline designated critical erosion areas. Areas designated and mapped based on 30 yr. erosion rate setback for residential and 60 yr. erosion rate setback for commercial/industrial. Table of required setback depths based on erosion category A, B, C, D.
<b>C. Dunes Construction Setback</b>	Acres-nd Miles-nd No data on miles of beachfront covered. setback based on edge of existing development as measured by utility lines and landlord walls: Misquamicut Beach- #miles-nd Coast Guard Beach- # miles-nd Sand Hill Cove- # miles-nd
<b>D. State Waters Classification</b>	Type I (Conservation) and Type 2 (Low Intensity) Acres- 3300 Miles- covers 70%-75% of the shoreline and development regulated along this entire shoreline area.

Sources: FEIS, RICRMP Regulations

## ADOPTED PLAN OUTCOMES ✕

\* Most states with approved local comprehensive, land use, or coastal area plans provided information on the number of local plans the state has approved. Otherwise, no statewide data was available on the results of local plan implementation such as natural resource protection areas, local setbacks, land use designations, and changes to land use or zoning.

\* For the states with adopted SAMP or other specialized plans, none of the following outcome measures are available: 1) aerial photo interpretation of on-the-ground changes since plan adoption; 2) periodic physical surveys of areas protected or managed under enforceable plans; 3) state and local permit data on activities permitted within approved plan areas, area and linear miles affected by approved permits and consistency of permitted activities with plan objectives. For public-held lands, there is some limited data on actions taken such as dune revegetation, but no data on results from such actions. (See under State Coastal Land Management and Acquisition section below) Only 2 of the 13 states with adopted SAMPs provided outcome data. See page 43 for the Guam Recreational Water Use Management Plan.

The California Malibu/Santa Monica Mountain (SMM) Transfer of Development Credit (TDC) Program is summarized below. In 1979, Coastal Conservancy and CCC developed TDC program requiring, as a permit condition, that proposed subdividers or builders of multifamily housing units extinguish or retire the development potential of comparable existing undeveloped parcels prior to the creation of new parcels or additional units in density. The purpose was to eliminate small undeveloped and poorly sited parcels that, if built, would increase erosion, runoff, and landslides. OUTCOME: By 1989, over 700 parcels of land were placed under open space easements or offers to dedicate open space easements in the SMM area. (Assessment, p.55)

\* Only 3 of the 14 states with adopted plans affecting state lands provided outcome data. This include: OR- Territorial Sea Management Plan with Rocky Shore Strategy; PA- 8 approved local plans under Bluff Recession and Setback Act with setbacks covering 50 miles or 94% of bluff-front. FL- 500 miles of beach under state erosion plan; 100 miles of beaches restored. Other states provide data on number of plans and areas covered but no results. For example, NY data shows 2 erosion management plans approved covering 25 miles or 20% of beaches.

### Examples of outcome data collected:

As indicated in Table 5, most coastal towns in Connecticut have adopted Municipal Coastal Program (MCPs) consistent with the CCMA policies and use guidelines that contain long-range land use plans for coastal development and conservation and implementing local zoning/subdivision regulations. There is no statewide data on local land use plans or local zoning/subdivision regulations. However, most have established setbacks from sensitive coastal resources and the high tide line. Through Municipal Coastal Site Plan Review (CSPR), municipalities regulate development between MHW and coastal boundary.



Table 5-A: Local Land Use Plans and Regulations, & Other Special Area Management Plans- Connecticut

YEAR	1995	1995
COASTAL GOVERNMENT	MUNICIPALITIES (Towns and Boroughs)	
1. Number in CZ	41	(36/4)
2. Number with Approved Plans (Municipal Coastal Programs)	35*	
3. Number with Setback Regulations ND (a) (Setbacks from beaches/dunes)		
4. Number with Dune Management Plans Acres Protected/Restricted Use	ND (b)	
KEY:		
NA- Not applicable		
ND no statewide data.		
* Local participation is voluntary. Of 6 not participating, three located along Long Island Sound: Madison, Greenwich, and East Haven		
(a) Most towns have setbacks from sensitive coastal resources (such as wetlands) and the high tide line required by zoning and/or subdivision regulations. But few have setbacks from the beach.		
(b) CZM has provided assistance the locals for development of dunes restoration plans		
Sources: 309 Assessment p. 16, Mary-Beth Hart, CZM staff.		

The State of California utilizes state goals, policies and guidelines with both state and local implementation. Local implementation is through adoption of Local Coastal Land Use Plans which 83% of the localities have adopted. All require either setbacks or case-by-case construction standards. However, no statewide database to determine effectiveness.

Table 5-B: Local Comprehensive Land Use Plans/Regulations, Other Special Area Management Plans- California

YEAR	1995	1995
COASTAL GOVERNMENT	CITIES/ COUNTIES/Total	LCP Segments(a)
1. Number in CZ	58 15 73	126
2. Number with Certified Local Coastal Land Use Plans (LUPs)		105 (83%)
3. Number with Certified Implementation Plans		88 (70%)
4. LCPs Certified and Issuing Permits		82 (65%)
5. Geographic Area Covered by Certified LCPs		1,387,129 acres (86% of CZ)
6. LCP Amendments Reviewed		738
7. Areas of Deferred Certification		42
8. Number with Beachfront Regulations		All with beaches*
9. Number with Bluff Regulations		All with bluffs*
10.. Number with Dune Management Plans Acres Protected/Restricted Use.		unknown*
11.. Number of SAMPs Acres Protected/Shoreline Miles		unknown*
12. Number of Environmentally Sensitive Areas Resource Protection Areas in beaches/dunes/bluffs/rocky shores Acres protected/Shoreline Miles		unknown*
13. Malibu/Santa Monica Mountain Transfer of Development Credit Program		
Results- +700 parcels placed on Open Space Easement (as of 1989) avoiding erosion, landslides on these small undeveloped and poorly sited lots.		
KEY:		
unknown- no statewide database.		
(a) The 73 coastal jurisdictions are divided into 126 segments for purposes of LCP planning.		
* All cities/counties with certified plans have provisions which meet state goals, policies and guidelines regarding beaches, dunes and bluffs and significant resource areas. However, some require setbacks, other have case-by-case siting/construction standards. No statewide database.		
Sources: Local Coastal Planning Program Annual report FY 1994-1995, p.16		

Guam has a single layer of government. All plans are island-wide. There is insufficient data in Table 7 to make a determination of effectiveness of the State land Use Plan or State Seashore Protection Plan or the Territorial Parks System. Guam has, however, adopted a Recreational and Water Use Management Plan for which data indicates that a 6 miles is protected and competing use conflicts managed.

Table 5-C: State Comprehensive Land Use Plans and Other Special Area Management Plans- Guam

Planning Tool	% of Coastline Covered (excluding federal lands)	% Guam Total Acreage/land Area (Guam CZ)
1. State Land-Use Plan	100%	100%
(a) Conservation Districts	nd	nd
(b) Habitat Protection Areas	nd	28,197 acres (21%land area)*
2. State Seashore Protection Plan	100%	10 fathom contour-10 meters inland
3. SAMPs		
(a) Flood Hazard Zones	nd	nd
(b) Recreational and Water Use Mgt. Plan **		
4. Territorial Parks System		
(a) Natural Preserves	nd	nd
(b) Conservation Reserves	nd	nd

KEY:  
nd- no statewide data.

\* Island wide- includes upland areas, not just shoreline also includes both Guam Government and federal lands.

\*\* A 6 miles stretch along coast and in water which addresses users conflicts along beach and in waters. Bird nesting areas identified and protected, Manahac fish-runs protected. Cannot operate jet ski except in management plan areas. Plan adopted as part of GCMP in 1990/91. Provides for "use zones" for certain water activities in planned areas, required buoyed areas for jet ski type vehicles and mechanized vehicular closure during predictable Manahac runs. Minimum operating age of 16 years for all mechanized water vehicles. Jet skis can only be operated in planned areas-- two such areas adopted, third area finalizing plan. In first area planned, Agaña Bay to Piti, encompasses 6 linear miles of coast to a distance varying from two hundred yards to half a mile. The second area, Cocos Lagoon, is a triangular shaped lagoon 3 miles long on the land side, extending 2 miles seaward. The third area is Apra Harbor, which is Guam's commercial port, the Navy port and Guam's Harbor of Refuge.

Sources: Michael L. Ham.

## STATE COASTAL LAND MANAGEMENT AND ACQUISITION OUTCOMES X

\* Although all 29 coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore, only 17 states have inventory data on their state coastal land holdings such as number of shoreline miles in state parks or percent of shoreline in public ownership. 5 states do not have information on the total number of beach miles. 5 do not know the number of state coastal parks. 10 do not know the number of beachfront coastal parks they own. 12 do not have information on the miles of state coastal park lands they own. 11 do not know the number of miles in state coastal lands.

\* Several states are active stewards of their public coastal land holdings. However, outcome data is scarce regarding: 1) number of accessways, marked trails, boardwalks, and dune crossovers; 2) dune restoration projects measured in acres, miles of shoreline involved, state funds; 3) beaches restored or renourished as measured in cubic yards, beachfront miles, state funds; 4) number of shoreline stabilizations installed with acres and shoreline miles affected as a counter-indication to stewardship; and 5) acres, shoreline miles in state coastal lands designated as conservation, preservation or protection areas and aerial photo interpretation, periodic physical surveys to verify condition of resources.

\* Of the 14 states which use boardwalks or dunes crossovers within their state coastal parks to guide pedestrian traffic over fragile beach and dune resources, 12 have provided limited data on the number accessways installed (See Figure 9-B). However, this data is of limited use without additional data which correlates access provided within each state park against length of shoreline or unmet access needs.

\* Of the 13 coastal states which employ dunes creation on state beachfront parks to repair and enhance the natural functions of their state-owned beach and dune systems, 9 have provided limited data on the

number of projects and/or miles of beachfront covered. (See Figure 9-B). This information is of limited use in determining effectiveness, since there is no data which correlates need for dune restoration against projects completed or project results.

\* Of the 17 coastal states which have used beach nourishment or renourishment as a management tool, 14 state have very limited data on the number of projects and/or miles of beachfront renourished. There is almost no state data on cubic yards of sand involved, costs, or long-term results of these projects. However, 15 states involve beach nourishment projects sponsored by the USACE and there is some data on federally-funded beach nourishment projects (See Appendix A, National Context Factors).

\* 11 coastal states have chosen to armor or to repair existing armoring structures in high erosion areas. 15 state have had federal USACE shoreline protection projects built along their coastlines. As with beach nourishment projects, data is very scarce. (See Figure 9-B) However, the fact that over 1/3 of the coastal states employ armoring on state-held lands indicates the policy priority preference for protecting upland structures and infrastructure in such areas.

\* Of the 26 coastal states which have natural resource protection areas, all have some limited data on the number of areas protected, the type of species protected, the type of resource area protected, and/or the number of acres protected. (See Figure 9-B). There is a need, however, for data on the value or condition of the habitat protected and the results of the protection activities in order to assess program effectiveness.

\* Of the 21 coastal states which are utilizing acquisition to purchase additional valuable coastal resources, 15 states provided some data on the number of properties and acres acquired. Most is coastwide or statewide acquisition data. (See Figure 9-A) For states with multiple coastline resources, data is not broken-down by beaches, bluffs or rocky shores. Very few states provided data on amount of money spent. There is need for data which can be used correlate acquisition of coastal lands versus all state lands acquired and to determine the relative priority of coastal land acquisition in the state's overall land acquisition program.

#### Example of outcome data collected:

Outcome indicator data show that ~25% of the **Massachusetts** coastline is in public ownership with only 5% being in state-ownership (See Table 6-A). There are 18 parks in the coastal frontage of Massachusetts (See Table 6-B). There is no outcome data on pedestrian access restrictions. There has been one federal/state sponsored beach nourishment project (See Tables 6-B and 6-C). The Rivers and Harbors Program funds dune restoration, beach restoration, and armoring projects. No data, however, was available on projects funded or project results (See Table 6-D). Outcome indicator data show that 2,250 acres were acquired by state agencies (See Table 6-E).

Table 6-A: State Coastline Ownership and Direct Land Management- Massachusetts

OWNERSHIP	LINEAR SHORELINE MILES
Total coastal miles	1,500
Public-Owned	~25%
State-Owned	~5%
Total Beachfront miles	222 miles of barrier beaches
Public-Owned	ND
State-Owned	ND
Total Rocky-Shore	ND
Public-Owned	ND
State-Owned	ND
Total Bluffs	ND
Key: ND- no data	
Source: Deirdre Buckley	

Table 6-B: State Coastline Ownership and Direct Land Management of State Parks- MA

MANAGEMENT	COASTAL NATURAL RESOURCE AREA
Activity	COASTAL FRONTAGE
# Parks	18
# MILES	63.46 miles
# FEET	335,064 feet
# Boardwalks	ND
# Park Plans	5 coastal park mgt. plans completed = 4,673 acres 5 coastal park beach plans in progress = 5,000 acres
# Dunes Restored	Yes- ND
# Beaches Renourished	2 - 3 MILES
# Protection Areas/Acres	14 ACECs = 75,000 acres

Key: ND- no data    ACE'Cs- Areas of Critical Erosion Concern  
Source: Deirdre Buckley

Table 6-C: Beaches Restored/Nourished/Renourished - MA

YEAR	PROJECT	MILES OF BEACH	CUBIC YARDS
1970 - 1996	Revere Beach	2 - 3 miles	ND

Note: USACE sponsored. There are several private projects and sand/material placement on beaches.- Jim O'Connell  
Key: ND-no data  
Source: Deirdre Buckley

Table 6-D: Dunes Restored and Shoreline Armored- MA

YEAR	PROJECT	MILES OF BEACH	CUBIC YARDS
1970 - 1996			
Dunes restored	Yes under Rivers and Harbors Program-	No data	
Shoreline Armored	Yes under Rivers and Harbors Program-	No data	

Source: Deirdre Buckley

Table 6-E: Coastal Lands Acquired- MA

Coastal Acquisitions: Open Space Bond Bill	
Year:	1978 - 1996
DEM	
Acquisitions:	
Acres/Linear Miles	2,100 acres/ no data on miles
Resource Area	coastal frontage
Acquisition Tool	Bond issue
Expenditures	36 million/ awarded \$70 million more through Open Space Bond Bill in 1987 and 1996
DFWELE	
Acquisitions	
Acres/Linear Miles	150 acres
Resource Area	coastal frontage - habitat protection
Acquisition tool	Bond Issue
Expenditures	3 million
MDC	
plans to restore Boston Beaches ; 5 year revitalization project , \$30 million	
DCS	
provides grants to municipalities to protect open space through Self-Help and Urban Self-Help Programs. Also DCS administers federal Land and Water Conservation /fund grants to targeted municipalities. To date only 273 acres of coastal frontage has been acquired through 17 acquisition project in over 20 years by local municipalities. Only 16 cities and towns have received grants - mostly in the Cape Cod/Islands region.	
Source: Deirdre Buckley	

## 7 CONCLUSIONS AND RECOMMENDATIONS

### CONCLUSIONS

Prior to enactment of the federal CZMA, state efforts to address protection of natural shoreline features such as beaches, dunes, bluffs and rocky shores were highly variable. State coastal management programs (CMPs) developed since passage of the CZMA were designed specifically to balance resource protection and development. State coastal programs have resulted in more attention to issues such as erosion, sea level rise, and cumulative adverse impacts resulting from development on receding beach and bluff shorelines and sensitive natural habitat areas. State CMPs have been at the forefront in addressing shoreline use conflicts such as the demand for shoreline armoring to protect existing upland structures to the detriment and loss of natural beach systems. Beach nourishment has been promoted by some coastal states as an alternative to continued loss of developed recreational beaches through shoreline hardening. Likewise, some coastal states have funded research into sand loss from inlet dredging and have demanded that beach quality sand from inlet dredging be placed on down-drift beaches. Whereas excavation of sand for coastal development was a common practice in the past, state CMPs prohibit such practices today and wage educational campaigns on the importance of protecting stabilized dune systems.

State CMPs serve as the institutional focus for addressing ongoing competing public and private demands for the use of our limited and sometimes fragile coastline resources. Our understanding of natural shoreline processes and the impacts of human development on these processes has grown. Today, we are no longer building as close to the shoreline. The development that does occur is better built to withstand coastal storm events. Efforts are made to guide access across fragile vegetated dunes. We are becoming better stewards of our natural coastal heritage through state CMP efforts. Balancing private property rights with natural resource protection goals remains a challenge.

**The national objective of protecting coastal resources is being achieved** through implementation of federally-approved state coastal management programs. State CMP efforts are effective overall in addressing protection of beaches, dunes, bluffs, and rocky shores, given that the CZMA requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline. Determination of CMP effectiveness has been based on process indicators and case examples.

**Coastal states are utilizing a wide variety of tools to achieve resource protection** including regulatory setbacks and controls over shoreline development in combination with planning, stewardship of state lands, coastal land acquisition, and research and public education about shoreline processes and human interactions. The primary tools employed are regulatory controls over land and water uses along the coast through setbacks, permits for coastline development, and restrictions on access and habitat destruction. All but three coastal states identified protection of natural resources and/or minimization of loss of life and property from coastal hazards as a high priority management issue. Although all coastal states own coastal properties, only three use state ownership and land management as the primary tool. Of the twenty-five tools identified with beach and dune protection, the fewest tools used by a state is eleven and the most is twenty-three. Of the thirteen tools related to bluff and rocky shore protection, the fewest tools used by any state is five and the most is eleven.

**More Systematic Resource Protection Occurring** - State coastal management programs have provided more systematic, extensive and intensive planning and review of projects along the shoreline resulting in minimized adverse impacts of improper development and erosion on natural systems and adjacent properties and structures. Greater attention has been given to cumulative effects of individual permit decisions; the measurement of erosion rates for establishing construction setbacks; the long-term adverse long-term effects of shoreline armoring on natural beach sand transport; and opportunities for nonstructural solutions to coastal erosion. As a result, less inappropriate development is occurring in hazardous areas such as migrating beaches and eroding bluffs.

**All but two coastal states have made significant changes to their program tools in the way they protect resources.** Significant changes have often included expansion of the geographic area or types of activities covered by shoreline setbacks or regulations and changes to limitations on shoreline stabilizations. Most give greater consideration to natural shoreline processes, even when addressing other concerns such as the need to protect developed eroding shorelines using structural measures. These changes complicate assessment of program effectiveness, using outcome indicators.

**Regulatory tools are the most significant tools employed nationwide** to protect shoreline resources. because the majority of the oceanfront shoreline is in private ownership and is subject to significant shoreline change and development pressures. The scope, policies, and provisions of state coastal regulatory programs afford greater natural resource protection. State coastal programs protect beaches, dunes, bluffs and rocky shores through setbacks, regulation of shoreline development and shoreline stabilizations, restrictions on pedestrian access, vehicular access, and habitat protection, and permit compliance/permit tracking systems. Most coastal states employ construction setbacks from the shoreline to provide a natural buffer between development and the water. Almost all coastal states regulate activities within defined coastal construction control areas in ways that minimize adverse impacts on the natural shoreline resources and protect critical habitat areas. Most coastal states regulate the use of shoreline stabilization structures to minimize adverse impacts on beach systems. However, only a few coastal states prohibit shoreline stabilization structures, thereby placing protection of beach systems as a policy priority over protection of upland structures. Many coastal states restrict pedestrian and vehicular access along portions of the shoreline. Pedestrian access restrictions channel human encroachment along boardwalks or dune crossovers, minimizing dune destabilization and limiting adverse impacts on fragile shoreline resources. Vehicular access restrictions keep vehicles off sensitive coastal habitat areas or limit vehicular use to government vehicles or off-road vehicles in areas planned for their use. Almost all coastal state have permit compliance programs to enforce their regulations and permit tracking systems.

**Planning tools, when combined with regulatory, are used effectively to protect natural resources.** Most coastal states with beach or bluff resources employ some type of planning tool. Locally-delegated permitting combined with mandatory local planning in eight coastal states provides the key management tool in protecting beaches, dunes, bluffs and rocky shore resources. Planning programs are more effective when combined with implementation through state regulation or local land use regulations, zoning and subdivision ordinances and other actions.

**Stewardship of coastal lands, through state land management and acquisition, is an important component of all state coastal programs.** All coastal states own state parks along the shoreline that encompass one or more beach, dune, bluff or rocky shore. Most coastal states have natural protection areas and guided accessways and many have acquired additional coastal land holdings. Almost half of the coastal states use boardwalks or dune crossovers to protect dune vegetation and minimize adverse impacts on natural resources and employ sand fencing and dune creation to restore the natural function of damaged dune systems. Over half of the coastal states use beach nourishment to recreate recreational beaches which are eroding away. Eleven coastal states have chosen to armor or repair existing shoreline stabilization structures in high erosion areas, primarily to protect coastal highways or other public infrastructure investments.

**Insufficient nationally compatible outcome data is available to determine on-the-ground effectiveness.** It is not possible to determine the on-the-ground effectiveness of state CPM regulatory, planning, state land management or acquisition programs, due to the scarcity of outcome data. Although about two-thirds of the coastal states have computerized permit tracking systems, no states keep statewide databases on the miles affected, the area affected, or the resources affected by permits approved for coastline activities. Regarding states with setbacks, the regulatory jurisdiction varies making cross-state comparisons difficult. States which delegate coastal permitting to local governments do not maintain multi-year databases on local permits. Data on conditions attached to permits are contained in paper files, not on permit tracking systems. Few states have any data on the results of pedestrian access and vehicular access restrictions and protected habitat areas.

Most coastal states with approved local plans have information on the number of plans approved but no statewide and longitudinal data on results of local plan implementation. For states with adopted special area management plans (SAMPs) or other specialized plans, outcome data is also scarce. Although all coastal

states own state parks along the shoreline that encompass one of more beach, dune, bluff or rocky shore, only a few states have inventory data on their coastal land holdings such as number of shoreline miles in state parks or percent of shoreline in public ownership. Several states are active stewards of their public coastal land holdings but outcome data is scarce regarding accessways installed, dunes restored, beaches restored, and other protection results. Of the coastal states which utilize acquisition, most have some data on the number and/or acres of coastal lands acquired. However, for most states, this data is not broken-down by type of resource area acquired and very few states have data on amount of money spent or acquisition priorities.

Determining "effectiveness" of state coastal program in protecting natural coastline resources based on *on-the-ground outcome indicators* is elusive. Determining the "effectiveness" of state coastal programs in protecting natural coastline resources based on *process indicators* and case examples is more possible, but still difficult. Case examples can be effective in illustrating how a management tool has been implemented in a certain geographic area and the results of such implementation.

**Competing Demands for the Use of the Shoreline and Competing Government Policies Continue to Require Balance** - State CZM programs continue to face decisions regarding competing demands for recreation and tourist development, protection of existing threatened properties, and the rights of private property owners versus public health and safety. Shrinking federal and state dollars for state CZM program administration, coupled with increased demand and expectations for CZM services, is a long-term concern for coastal programs. Several federal agencies, state CZM programs, local coastal governments, and other non-profit organizations each play a role in managing our nation's coastline resources. Inconsistencies between certain federal agency programs and state CZM objectives is an ongoing concern. For example, the FEMA flood insurance program and the federally-funded shoreline protection projects of the USACE achieve objectives which undermine some state CZM natural resource protection objectives. The unique role of state coastal zone management programs has been to focus attention and resources on improving the state and local land use controls and other tools to minimize the adverse impacts on natural resources.

## RECOMMENDATIONS

**Develop a computerized CZM database** - OCRM should seek funding from Congress to establish a computerized monitoring and tracking program for state and federal agency CZM activities, the results of which should be published in a biennial state-of-the-coast report to Congress. This should include a computerized coding system and an information tracking and recovery system for all information submitted by coastal states. OCRM should prepare up-datable state CZM program summary files for each coastal state with information about the state program, periodic changes to the program, program activities, CZM projects undertaken, results and reports produced.

**Share Information Through the Internet** - OCRM should create a home page on the Internet and a CD-ROM of the National State of the Coast Report and National CZM effectiveness study and other CZM databases.

**Incentives for Coastal States to Refine and Expand their Process and Outcome Data Collection and Record Keeping** - OCRM should seek funding from Congress to form a coastal states task force with the objective to change the coastal states reporting requirements under 306, 309, and 312 to better address results of state CZM activities and their effectiveness in meeting state and national CZM objectives. This should include accepted methods for organizing, collecting, storing, and reporting accurate and precise data on program activities and results which include trend data usable in future assessments of CZM effectiveness. The types of outcome indicator data that OCRM and the coastal states should consider collecting to measure program results for protecting natural beach, dune, bluff and rocky shore resources are provided on page 53.

OCRM should also encourage coastal states to improve their daily record keeping and yearly reporting to OCRM on program implementation and results. They should be encouraged to continue to develop and refine computerized permit tracking systems regarding permitted activities to refine the individual permit entries to include data on type of project, area and resources affected, length of shoreline affected, size of project, permit restrictions/conditions and other data which, when analyzed yearly, could assess the individual and cumulative impacts of projects permitted along the coast. OCRM should encourage states which delegate implementation

to local governments to monitor, collect and report on local implementation and results. States should be encouraged to explore the use of in-depth case studies as a way to provide more meaningful explanations of how CZM works and the on-the-ground results, rather than relying on case examples and success stories. State should be encouraged to explore the use of aerial photo interpretation for measuring long-term changes in develop and resources along the coast.

**Federal agencies should monitor changes to the coastal environment and report on changes every five years.** OCRM should compile data from U.S. Bureau of the Census on population changes in coastal counties. Congress should fund the appropriate federal agency to conduct aerial photo interpretations of shoreline development and changes in development patterns. USDOl should compile data on private development occurring on designated Coastal Barrier Resources Act (CBRA) units and federal/state agency actions affecting CBRA designations and implementation success. USACE should be funded by Congress to conduct follow-up national shoreline studies on erosion, shoreline armoring, beach nourishment, and public ownership of the coast. USDOl/FWS should compile data on coastal endangered species and habitat loss/protection changes and role of federal and state agencies in this effort.

**Utilize the Section 309 Assessment Process to address issues associated with shoreline change.** OCRM and the Coastal States should continue to utilize the section 309 Assessment process to address substantive issues associated with the protection of natural coastal systems. Significant changes to state coastal programs such changes in activities exempt, shoreline armoring allowed and the landward extent of regulatory jurisdiction should be carefully scrutinized for their long-term effects on natural coastal systems.



## **APPENDICES**

### **APPENDIX A: NATIONAL AND STATE CONTEXT FACTORS**

### **APPENDIX B: METHODOLOGY & SURVEY INSTRUMENT**

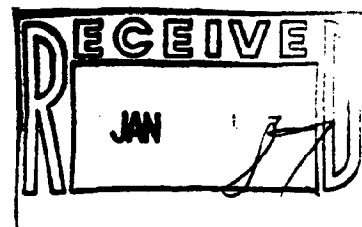
**B-1 Methodology**

**B-2 Survey Instrument**

### **APPENDIX C: SUMMARY TABLES**

### **APPENDIX D: CASE EXAMPLES**

### **APPENDIX E: BIBLIOGRAPHY**



## APPENDIX A: NATIONAL AND STATE CONTEXT FACTORS

### Factors affecting protection of coastal beaches, dunes, bluffs, rocky shores

State CZM programs for protecting beaches, dunes, bluffs and rocky shores are influenced by a variety of physical, social and economic context factors including: (a) the type and extent of the resource in a given state; (b) coastline erosion processes and storm events; (c) coastline ownership and development; (d) human interference with natural processes; (e) competing demands placed on natural coastal resources and state priorities for balancing these demands; (f) shared coastal management responsibilities between states, federal agencies and non-governmental organizations; and (g) the unique role of the CZM program in the state.

### Type and Extent of Beach and Dune, Bluff and Rocky Shore Resources

Beach resources are present along portions of all coastal state shorelines, though the length and character of such beaches vary considerably. Sandy beaches can be categorized into three distinct types: barrier beaches, mainland beaches, and pocket beaches. The Gulf of Mexico and Atlantic Coast is characterized by a system of *barrier beaches* and a relatively wide continental shelf, as is much of Alaska. Barrier beaches are part of a complex integrated system of beaches, marshes, bays, tidal flats, and inlets. These beaches are constantly migrating, eroding and building in response to natural processes and human activities. *Mainland beaches* stretch unbroken for many miles, some low standing and prone to flooding, others backed by steep headlands. They received sediment from nearby rivers and eroding bluffs. Examples include Long Island, northern New Jersey and southern California. *Pocket beaches* form in small bays surrounded by rocky cliffs or headlands. The headlands protect the sandy alcoves from erosion by winter storms and strong currents. Pocket beaches are common in Maine and the Pacific Northwest. Other coastline variations are based on plate tectonics or type of wave forces. Difference and variations in beach and dune coastline systems within a state, between states and within regions are factors affect states enactment and implementation of certain beachfront management tools.<sup>1</sup>

Headland/rocky shorelines and bluffs/cliffs are present along the West Coast, the North East Coast, the Great Lakes Coast, and Territorial shores. These features are absent along the low elevation Southern and South Atlantic coastlines. The underlying geology of active tectonics, faulting and earthquakes or glaciers, ice gouging and rafting, or ice and strong wind determine shore stability and erosion factors which effect state management responses.<sup>2</sup> Eroding bluffs and cliffs of the Great Lakes states, creating beaches and dunes, are subject to highwater levels which, when driven by storm winds and waves cause flooding and lakefront deterioration.<sup>3</sup>

Table 1 provides the length of the US coastline, using NOAA, U.S. Department of Commerce data, that includes two measures, one of direct oceanfront miles where they cross bays and sounds and the other tidal shoreline miles which extend inland to the head of tidewaters or to a point where tidal waters narrow to a width of 100 feet. The national shoreline, as measured by the US Army Corps of Engineers, to the head of tidewaters, or to the point where tidal waters narrow to 100 feet is also shown. Percent of direct ocean coastline in beaches, rocky shores and bluffs is also indicated from state CZM program estimates. For 8 of the 29 coastal states, their entire ocean coastlines are sandy beaches with no rocky shores or bluffs. All other 21 coastal states have other beaches and rocky shores, backed by bluffs or sand dunes.

<sup>1</sup>Beatley, Timothy, David J. Brower, and Anna k. Schwab. 1994. An Introduction to Coastal Zone Management

<sup>2</sup>Ibid.

<sup>3</sup>National Committee on Property Insurance. 1998. America's Vanishing Coastlines: A New Concern for the Voluntary and Residual Property Insurance Markets. p.23

### **Coastline Ownership**

State jurisdictional ownership of beaches usually begins at mean high water and extends seaward. This leaves extensive dry sanding beach and dune systems in private ownership, except where governments have acquired beachfronts for recreation or preservation. Seventy percent of our nation's shoreline is in private ownership (excluding Alaska where 99% is publicly owned). As of 1970, three-fifths of the shoreline was undeveloped (excluding Alaska).<sup>4</sup> Development pressures vary depending on geography and climate issues. Inaccessible and hard to develop shorelines, such as rocky shores, are less prone to development than accessible sandy beach areas. A state's beach and dune management varies depending on the extent of public ownership. For the 20 coastal states (not including the islands or the Great Lake States), public ownership ranges from a high of 99% for Alaska to a low of 3% for Maine. For 11 of the 20 states, over 1/4 of the shoreline is in public ownership. (see Table 1).

### **Coastline Development, Population Growth, and Economic Pressures on Shoreline Properties**

As early as the late 1800s, recreational tourism began along our nation's beaches. With the advent of the automobile, seasonal seaside resorts evolved. The summer homes and fishing villages of the 1940s and 1950s were transformed by the 1970s into "cities on the beach."<sup>5</sup> Today, due to population and economic pressures, over half of our nation's population lives within 50 miles of the coast and our nation's coastal zone is over four times more densely populated than the national average.<sup>6</sup> In addition to the retirees who migrated to the coast and other year round residents, tourists and conventioners are demanding beachfront coastal resorts. This is most pronounced along our coastal barriers at high risk due to coastal flooding, hurricanes and erosion. Billions of dollars in private development and public recreation and infrastructure is invested on these unstable coastal barriers.<sup>7</sup> The demand for coastal waterfront property has lead to increased residential development pressures along our nation's coastal bluffs and rocky shores.

The persistent development along our nation's coastline had lead to destruction of coastal dunes systems and placement of structures in jeopardy from both short and long-term erosion. Shoreline development prior to the 1970s were frequently armored with seawalls, revetments, bulkheads or other shoreline stabilization structure to protect upland private and public investments from erosion. Such stabilization structures accelerated the loss of sandy beaches.<sup>8</sup> Table 1 shows coastal county population change between 1970 and 1990. For 17 of the 29 CZM states, population growth was over 30% (major impact); for 4 population growth was between 10 and 29% (moderate impact); and for 8 population growth was 0% to 9% (minimal impact.)

The cost of purchasing oceanfront and waterfront properties along our nation's shorelines are considerably higher than for non-waterfront properties. Likewise, the value of such properties have increased at a faster rate. The seasonal beachfront cottages of yesterday have given way to much larger and more expensive developments, often high-rise multi-family condominiums. The result is intensive, extensive and expensive investments in known coastal high hazard areas. Barrier islands have become a magnet for retirees and vacation homes.<sup>9</sup> About half of

<sup>4</sup>Ibid.

<sup>5</sup>Platt, Rutherford H. et al. 1987. Cities on the Beaches: Management Issues of Developed Coastal Islands.

<sup>6</sup>U.S. Department of Commerce, NOAA. 1990. 50 Years of Population Change along the Nation's Coasts: 1960-2010.

<sup>7</sup>Platt, Rutherford, et al. 1992. Coastal Erosion: Has Retreat Sounded?, p.12.

<sup>8</sup>Ibid., p.8

<sup>9</sup>U.S. Department of Commerce, NOAA, NOS. 1992. Building Along America's Coasts: 20 Years of Building Permits, 1970-1989. p.5

all residential and non-residential construction in the U.S. between 1970 and 1989 occurred in coastal areas. The most dramatic growth has occurred in the Florida and California.<sup>10</sup> Despite the environmental degradation associated with population growth, these shoreline areas remain in strong demand for commercial, residential, tourism and recreation.

### **Coastline Erosion**

Coastal erosion, the landward displacement of the shoreline, is a normal process that has been going on for many years along most of our nation's sandy beaches. Gradual long-term erosion from normal wave action (of 1-3 feet per year) is accelerated by severe storm events during hurricanes and winter storms, sea level rise, the greenhouse effect; and man-made shoreline stabilizations.<sup>11</sup>

The only nationwide survey of shoreline erosion, published by the U.S. Army Corps of Engineers in 1971, estimates that at least 7% of our nation's coastline is critically eroding where properties are in imminent danger of collapse and 25% is experiencing significant erosion.<sup>12</sup> In addition to long-term erosion, many coastal states have experienced shoreline loss and property destruction through periodic storm events. Bluff recession is also a problem along the Great Lakes States.

The average rate of erosion is determined locally through historical shoreline records or shoreline modeling. A few examples of documented shoreline retreat dramatize the management urgency of coastal erosion. Cape Shoalwater, Washington has been eroding at the rate of more than 100 feet a year since the turn of the century. It's sparsely settled sand dunes have retreated an outstanding 12,000 feet, or more than 2 miles since 1910.<sup>13</sup> Most of the barrier islands along the east and gulf coasts are retreating landward by 1 to 10 feet per year—rates of up to 20 feet are not uncommon for specific locations.<sup>14</sup> Every coastal state is affected by shoreline change and erosion.<sup>15</sup> Table 2 shows, by state, the amount of coastal shoreline threatened by erosion.

Sea level rise and land subsidence, as a contributor to shoreline erosion, are recognized problems along portions of our nations' coastline. If accurate, the long-term costs to protect existing development, shoreline stabilizations, and infrastructure would be staggering.<sup>16</sup>

### **Coastal Storm Events**

Coastal storms and hurricanes exacerbate long-term erosion, shifting the position of beaches and sand dunes and splintering and collapsing erodable bluffs. Rapid shoreline erosion caused by high storm surge and wave heights overtop dunes and damage beachfront buildings in harms way. Wave attack at the base of steep slopes, undercut and collapse overhanging banks and topple properties perched on such bluffs. Large tsunamis waves with speed and height have inflicted great damage to California and Hawaii coastal areas. Between 1980 and 1995, 11 separate billion-dollar weather disasters struck coastal areas of the US: 9 hurricanes, 1 Nor'easter and 1 tropical storm resulted in over \$46 billion in damages.<sup>17</sup>

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<sup>10</sup>Ibid

<sup>11</sup>Kaufman, W., and O.H. Pilkey, Jr. 1983. The Beaches are Moving.

<sup>12</sup>U.S. Army Corps of Engineers. 1971. National Shoreline Study.

<sup>13</sup>National Committee on Property Insurance. 1988.

<sup>14</sup>Ibid

<sup>15</sup>U.S. Army Corps of Engineers. 1971.

<sup>16</sup>S.D. Lyles, L.E. Hickman., and H.A. Debaugh. 1988. Sea Level Variations for the United States, 1855-1986. US Department of Commerce, National Oceanic and Atmospheric Administration, Rockville, Maryland.

<sup>17</sup>U.S. Department of Commerce, NOAA, NCDC. Home Page  
<http://ncdc.noaa.gov/publications/billionz.html>

### Human-Interference with Natural Processes

Beach systems, and sandy beaches in particular, are dynamic. They advance and retreat, but over several cycles maintain state of equilibrium. Beginning as early as the 1890s, a variety of human modifications to the physical shoreline have been undertaken to achieve objectives that run counter to the protection and dynamic equilibrium of natural beach/dune systems. This host of human interferences have adversely affected the natural sand transport system, destroyed or caused dune instability, and increased erosion. These include the damming of coastal rivers; dredged navigational channels with jetties for shipping and dredged tidal inlets for commercial fishing and recreational boating; the placement of dredged spoil and beach quality sand offshore beyond the littoral sand transfer system; shoreline armoring; sand-trapping structures such as groins and breakwaters; sand mining for development; and sand scraping practices. Efforts to recreate natural beach/dune systems include sand fencing and dune revegetation, beach nourishment, and inlet sand transfer.<sup>18</sup>

The *damming of coastal rivers*, to protect urban areas downstream from flooding and provide hydro-electric power, has trapped sediment that would normally feed coastal beaches. Sediment starved beaches occur most on the west coast, but some east coast beaches are also affected by river diversions. *Inlet dredging* to maintain established boating and shipping access through coastal barrier passes that open and close with storm events has, until recently involved disposal of dredge material offshore beyond the littoral sand transfer system. The loss of this sand to the nearby beaches has increased erosion. For major navigational channels, the installation of *jetties* to stabilize the such inlets results in trapping sand on the updrift side of the inlet and starving the downdrift beaches. *Offshore breakwaters* used primarily to stop wave action and create a quiet water area for safe boat moorings obstruct the free flow of sand along the coast and starve downstream beaches.

*Shoreline armoring* through placement of seawalls, revetments, bulkheads, or riprap to protect private oceanfront structures and public infrastructure from erosion has occurred at the expense of lost recreational beaches. These wave-resistant walls may withstand wave action and protect upland properties but rapidly remove sand from the beach and eventually fail or require more substantial armoring.<sup>19</sup> *Groins*, structures extending into the water to interrupt and accumulate sand on the updrift shore, also starves downdrift adjacent beaches. Most of our nation's urban oceanfronts have been armored, although the percent of our nation's beachfront/oceanfronts that has been armored is unknown.

*Sand mining*, the removal of sand from beaches, dunes, adjacent areas, or riverbeds near was common practice in many states for road construction and development fill. This resulted in a loss of sand and protective dune areas, making such areas vulnerable to coastal flooding from storm events and accelerating erosion. *Sand scraping*, the practice of moving sand accumulated at one portion of the beach to another to build back a dune or the practice of leveling sand in front of a beachfront development to provide visual access to the water, has been allowed in many states. The negative effects include unstable dunes and low-lying dune areas vulnerable to breaching in storms.

Three activities have been used to try to recreate the natural beach/dune system. Dune restoration through *Sand fences and dune revegetation* has been used to stabilize and re-build dune areas. This helps limit breaching and creation of new inlets during major storms. *Beach renourishment and period nourishment* has become a popular alternative to armoring, in attempting to artificially create or recreate a beach area through the importing of compatible sand and pumping/placing it on the eroded beach area. The flattened beach profile and wider

<sup>18</sup> US Army Corps of Engineers. 1971 and Platt. 1992.

<sup>19</sup> U.S. Army Corps of Engineers. 1971. Shore Protection Guidelines, pp32-33

beach width mitigates erosion losses and storm-induced inundation. In certain high erosion areas, however, sand is rapidly washed away. Finding suitable sand source borrow areas also poses challenges. *Sand transfer facilities* which pump sand from updrift accumulation areas to downdrift beaches has ameliorated this problem. In Florida, for example, over 80% of the beach erosion on the state's Atlantic coast is estimated to be caused by 19 maintained inlets, most stabilized with jetties.

#### **Balancing Competing Demands for Protection of Natural Resources with Protection of Private Oceanfront Properties and Supporting Public Infrastructure**

Sandy beaches backed by dunes or bluffs, rocky shores and wetlands constitute the three types of natural shoreline features along our nation's coastline. The natural resource protection values of these features are often in conflict with social and economic values as reflected in shoreline use and development. State CZM programs were created, in part, to provide institutional mechanisms and management tools to balance the competing demands placed on these shoreline features.

The natural resource protection values of beaches and dunes commonly identified by state coastal programs include the first line of defense and protection of upland properties from storms and high tides; and wildlife habitat for marine life such as sea turtle nesting areas, bird nesting and staging areas, and endangered species habitat. Key use values of beaches and dunes are recreation, tourism and access to coastal waters. On the flip side of the coin, social and economic demands have also made oceanfront properties highly desired places for second-homes, resorts and year-round residences. Beachfront and bluff-front development built too close to the edge and now in jeopardy has led to shoreline armoring which has destroyed the natural beach/dune systems which attracted people to the coast in the first place. In addition, cutting and maintaining of inlets for recreational and commercial navigation has permanently disrupted the natural transport of sand along the beachfront, accelerating the loss of recreational beaches.

Coastal bluffs, sitting behind extensive or minimal beaches, have been thought of as excellent features for providing coastline vistas. In a few states, select bluff areas have been acquired and managed as natural resource protection areas or scenic vista areas. Most are managed as high erosion areas where development and other activities are regulated to minimize erosion risks rather than protect valuable natural resource features. The social and economic pressures for ocean vista developments have resulted in the siting of development along bluff recession areas in harms way.

Rocky shores, located within the inter-tidal zone, are recognized as high energy environments and valuable marine habitat. The inter-tidal areas are under state ownership and management. Although public access and recreational enjoyment of these areas has not been restricted, states are beginning to limit public access to avoid over-utilization and destruction of tide pool areas. Rocky shoreland areas have for the most part been resistant to erosion and therefore not managed as high hazard areas. Likewise, they have not been considered developable, though development often occurs immediately landward of these features.

Balancing such competing demands has become a key role of state CZM programs (see below). As our understanding of the impact (both individual and cumulative) of human activities on natural systems grows, coastal managers are looking for alternative management approaches to allow activities but minimize their negative impacts on resources of known public benefit. The U.S. is based on strong private property rights laws. The private property takings issue in the regulation of coastal land and water uses is of paramount importance in the development and implementation of coastal management tools. Over the years, states priorities in balancing resource protection and development have varied and altered. Today, coastal programs are required to justify their management decisions basing complex technical data sets. Refinements

to shoreline setbacks, based on historical erosion rates, demands sophisticated and complex computer modeling programs.

Government has invested billions in public infrastructure along our nation's coastlines from highways and bridges to water and sewer systems to support mainly private development and some public facilities including military facilities, coast guard stations, hospitals schools and recreation facilities. Beginning in the 1980s, in recognition of the hazardous nature of barrier islands, federal and state agencies have begun to limit their public investments in such areas.

### **Shared Coastal Management**

Several federal agencies have a long history of involvement with our nation's coastlines, all pre-dating the Federal CZM Act of 1972. Key federal players involved in activities affecting beaches, dunes, bluffs and rocky shores include the U.S Army Corps of Engineers, the Federal Emergency Management Agency, the U.S. Department of Interior/National Park Service/US Fish and Wildlife Service. Starting in 1972, the U.S. Department of Commerce/Office of Ocean and Coastal Resource Management became responsible for administering the Federal CZM Act.

**The Army Corps of Engineers (COE)** administers the 1) federal shoreline protection program through research, planning, design, construction management, federal cost-sharing; 2) authorized navigation channel dredging; and 3) federal permits for dredge and fill involving any construction or other activity which affects navigable waters including federal guidelines for beach nourishment and shoreline stabilizations. The COE Published the National Shoreline Study in 1971, and is working on analysis of Federal shore protection program for Congress.

The COE shoreline protection program covers construction projects for hurricane and storm damage reduction, beach erosion control, navigation, mitigation and recreation. Since 1930, Congress has authorized 137 projects or studies involving 19 of the 29 CZMA states plus 4 coastal states not in the CZM program. A total of 82 Federally-sponsored shore protection projects were constructed between 1950 and 1993 in areas of concentrated development experiencing severe erosion and/or property damage from storms. The projects protect 226 miles or less than 0.3 % of the 84,240 mile of tidal shoreline of the U.S. and only 8% of the 2,700 miles of COE identified "critical-erosion" coastline.<sup>20</sup> Of the 82 projects, 56 were large projects costing \$1,177.3 million in 1993 dollars. The cost-sharing was 60% federal and 40% non-federal (state, locals, and private) sponsors.<sup>21</sup> These projects involve one or more of the following: 1) initial beach restoration, sometimes with dune filling; 2) periodic beach nourishment; 3) shoreline structures-groins, seawalls, revetments, breakwaters, bulkheads, or sand transfer plants; 4) emergency measures to repairs storm damaged projects. The significant shift from reliance on fixed structures in the 1950s to beach restoration and periodic nourishment in the 1970s by the COE, is based on a realization that fixed structures protect upland property but destroy recreational beaches. Artificial beaches as a primary means of shore protection has become a major component of the COE program. the concept of replicating the protective characteristics of natural beach and dune systems. However, beach renourishment is not without its critics. In 1983, 1 million square yards of sand placed on the beaches of Ocean City, New Jersey at a cost of \$5.5 million. Within a few years, storms removed and redistributed much of the sand.<sup>22</sup> In 1993, the COE initiated an investigation and analysis of the benefits, environmental effects, and the existence of induced development resulting from Federal shore protection program.<sup>23</sup> The small percent of our nation's coastal erosion problem covered by the

<sup>20</sup> U.S. Army Corps of Engineers. 1971.

<sup>21</sup> U.S. Army Corps of Engineers. 1994. Shoreline Protection and Beach Erosion Control Study: Phase I: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers.

<sup>22</sup> Nordstrom, Pilkey et al. 1986. Living with the New Jersey Shore. Durham, N.C. Duke University Press.

<sup>23</sup> U.S. Army Corps of Engineers. 1995. Shore Protection and Beach Erosion Control Study: Economic Effects of Induced Development in Corps-Protected Beachfront Communities.

COE, leaves state CZM program with major responsibilities to cope with and address appropriate erosion responses. See Table 3 for shoreline protection projects by state between 1950-1993.

The COE navigation channel dredging program began with the Harbors Act of 1890. Since then Congress has authorized 830 navigation projects for channels for shipping, commercial fishing and recreational boating involving every coastal state, territory and commonwealth.<sup>24</sup>

The COE permit program for dredge and fill projects in navigable waters is subject to federal consistency provisions. Only one coastal state, Alaska, relies on the minimum standards contained in the COE regulations for placement of shoreline stabilizations. All other coastal states have their own state regulatory programs covering shoreline stabilizations and other activities over coastal waters.

**The Federal Emergency Management Agency (FEMA)** administers the Federal Flood Insurance Program that produces rate insurance maps and insures properties within the 100-year flood zone for local community participating in the program. Insured coastal structures, when damaged or destroyed, receive insurance claim payments to repair or rebuild. Critics have argued that, despite local code requirements, the NFIP promotes subsidized inappropriate development in coastal high hazard areas, impeding state management efforts to restrict new development and redevelopment in these areas.

In 1994, Congress required FEMA to conduct an evaluation of the economic impact of mapping coastal erosion areas and then denying flood insurance for existing and new structures in such areas, establishing actuarial rates, and changes in the tax base of communities.<sup>25</sup> As of 1992, there were over 66,000 NFIP policies in effect covering structures in the hazard zone (V-Zone).

Under the Upton/Jones Program 1988-1995, FEMA allowed for payment of flood insurance claims to demolish or relocate buildings imminently threatened by erosion. A total of 434 claims have been approved under this program. 73% for demolition. (See Table 4 for claims by state). FEMA is currently conducting an evaluation of economic impact of mapping erosion hazard areas for Congress.

**U.S. Department of Interior (DOI), National Parks Service (NPS)** created and manages 10 National Seashores covering 592,627 acres and 4 National Lakeshores covering 228,716 acres. **The DOI U.S. Fish and Wildlife Service (USFWS)** enforces federal wildlife and endangered species laws and maintains system of national wildlife refuges. In cooperation with states and local communities, USFWS identifies and protects beach and dune areas which provide nesting sites for endangered sea turtles and birds through limitations on sand fencing and beach nourishment during nesting season. Rocky shores, habitat for the Stella Sea Lion and other endangered mammals. There are several National Wildlife Refuges along our nation's coastline. These national wildlife refuges are managed by USFWS to preserve the natural beach/dune systems.

DOI/USFWS also administers the Coastal Barrier Resources Act of 1982 and Coastal Barrier Improvement Act of 1990. The purpose of the Act is to minimize loss of human life, wasteful Federal expenditures, and damage to fish, wildlife and associated natural resources. The Act restricts federal expenditures and financial assistance that have the effect of encouraging development on designated coastal barriers along the Atlantic, Gulf and Great Lakes shorelines. This includes prohibitions on National Flood Insurance, HUD assistance, public infrastructure, and other financial assistance. The system includes 582 units, comprising over 1.3 million acres and 1,276 miles of shoreline that are not publicly owned or otherwise protected. An addition 173 units of otherwise protected areas are covered under the 1990 Act which includes public barrier holdings in federal, state and local ownership. These areas include national wildlife refuges, national parks and seashores, state and local parks and conservation lands. (See Table 5)

<sup>24</sup>U.S. Army Corps of Engineers, Institute of Water Resources, Table D, Unpublished Report.

<sup>25</sup> FEMA. Undated. "Section 577 of the National Flood Insurance Reform Act of 1994--

"Evaluation of Erosion Hazards": Overview of Study Plan." (provided by Mark Crowell, FEMA)



**The U.S. Department of Defense** owns coastal properties within military bases, some significant tracts along the eroding coastline. The closing of certain bases and disposal of coastal properties will pose choices between sale for development or transfer for public preservation.<sup>26</sup>

Nonprofit conservation organizations have played a significant role in preserving certain coastal barrier lands. **The Nature Conservancy, the National Audubon Society and the Trust for Public Lands** and their partners have selectively acquired parcels for protection. Just over half of the shoreline of coastal barriers on the Atlantic and gulf of Mexico are protected through public or quasi-public ownership.<sup>27</sup>

#### **Unique Role of States CZM Programs**

All coastal states are involved with the protection of their natural resources through a variety of state and local management controls. 29 of the 35 coastal states, territories and commonwealths have federally-approved CZM programs. The management tools these states utilize to protect beaches, dunes, bluffs and rocky shore include regulatory, planning, direct land management, acquisition and other techniques. These tools are discussed in detail in this study. In most states, local governments participate through local land use controls. The unique role of state CZM programs has been the creation of unified state programs which articulates the conflicts among competing uses, the policies of the state and the balance or method used to resolve conflicts; and utilizes land use controls, both state and local, to manage shoreline uses.

State CZM programs have become increasingly involved in identifying the problems of eroding beach/dune systems and developing coordinated responses through statewide beach management and erosion control plans. States concern about adverse affects on downdrift beaches from federal dredging of navigation channels, offshore disposal of dredged materials, and loss of recreational beaches from shoreline armoring, has lead states CZM programs to take a proactive role in shaping state and federal policies and programs. In recognition of the adverse effects on recreational beaches from shoreline armoring. For example, the South Carolina CZM Program pushed for Congressional recognition that COE dredging of Charleston Harbor was causing severe beach erosion on the sand-starved downdrift beaches and led to the Folly Beach renourishment mitigation project.<sup>28</sup> The State of Florida passed legislation requiring that suitable beach quality sand from be inlet and navigational channel dredging be placed on the down-drift beaches and used federal consistency and state-funds to negotiate with the COE to place 1.4 million cubic yards of sand from St. Mary's inlet dredging on the down-drift beaches rather than losing the sand to the offshore system.<sup>29</sup> Several states have passed legislation limiting the use of new shoreline stabilizations, in an effort to protect beach and dune systems at the expense of private upland properties.

The inappropriate siting of structures on coastal barriers, in coastal flood zones and on erodable bluffs is a problem which state CZM programs inherited. Thus when the state CZM programs began in the 1970s, certain portions of our nation's coastline were already committed to intense development and other areas already zoned and platted for development. Shoreline erosion was a recognized problem, but land use controls were not well developed. State CZM programs would provide the testing grounds for land and water management to balance competing demands along our shoreline and minimize adverse impacts on valued natural coastal resources. State CZM programs would be at the forefront of the "quiet revolution in land use controls" and "integrated coastal management."

All states with significant beaches, dunes, bluff and rocky shore resources rank protection of these resources as a high priority. Most focus on the coastal hazard.

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<sup>26</sup>Platt. 1992.

<sup>27</sup>Ibid.

<sup>28</sup>U.S. Army Corps of Engineers. Water Resources Development in South Carolina. 1993. p.44

<sup>29</sup>State of Florida. Florida Castal Management Program. Best Projects Report, 1988. p.19

This project explores the CZM management tools developed, refined and employed to protect beaches, dunes, bluffs and rocky shores and the effectiveness of the management tools in achieving national objectives. Included will be documentation of regulatory controls such as setbacks from beaches/bluffs, controls over shoreline stabilizations and the policy shift towards beach nourishment and shoreline retreat. Also include will be direct land management of beachfront parks, acquisition of beaches and coastal resource areas, and the use of planning and research tools such as beachfront management plans.

#### **Financial Support**

Federal CZM funds for State CZM Program implementation between 1974 and 1992 have amounted to \$858, 849,000 for all program activities including Section 305-program development, Section 306-program implementation, Section 308-interstate grants, and Section 309- enhancement grants. CZM Section 306 Program Implementation Grants to individual states in 1995 ranged from a low of \$600,000 to a high of \$2.5 million for a given coastal state.<sup>30</sup> State spending of CZM funds for natural resource protection has varied depending on competing state priorities.<sup>31</sup>

#### **Tables of National and State Context Factors**

Table 1: Length of US Coastline, Population Change, Resources Present, Public Ownership

Table 2: Coastal Shoreline Erosion - Percent Eroding by State

Table 3: US Army Corps of Engineers Major Shoreline Protection Projects in CZM States  
1950 - 1993

Table 4: Upton-Jones Coastal Claims Summary

Table 5: DOI- Coastal Barrier Resource System

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<sup>30</sup>Bill Millhouser, phone interview. U.S. Department of Commerce, Office of Ocean and Coastal Resource Management.

<sup>31</sup>Natural Coastal Resources Research and Development Institute. 1990. Valuing Coastal Zone Management. p.11

Table 1: Length of US Coastline, Population Change, Resources Present, Public Ownership

State	Open Ocean Coastline miles (1)	Total Shoreline Miles (2)	National Shoreline Miles and % Critically Eroding (3)	% State Land Area (4)	% State Population in Coastal Zone (4)	Coast Pop. density 1990 person per sq. mile (4)	% Coast Pop Chg 1970-90 (5)	Presence of Natural Coastal Resources and Beach and Rocky Shore as Percent of the State's Open Ocean Coastline (6)	Beaches (6)	Dunes	Bluffs	Rocky Shores	% Open Coast Public (7)
AL	46*	607	352	8	6	12	171	27%	Y-100%	n	n	n	5%
AK	6640	33904	47300	>1	67	85	1	89%	Y-nd	?	y	y	99%
AS	126	126	nd	nd	100	100	607	72%	Y-nd	n	y	y-nd	9%
CA	840	3427	1827	4	24	73	605	39%	Y-nd	y	y	y-nd	47%
CT	0 (a)	618	270	9	47	62	887	8%	Y-31%	Y-rare	Y-25%	Y-14%	20%(a)
DE	25*	381	226	12	100	100	338	22%	Y-100%	y	n	n	75%
FL	1266*	8426	6266	5	100	100	228	90%	Y-65%	y	n	n	nd
GU	108*	110	nd	3	100	100	637	57%	Y-37%	n	y	y-63%	nd
HI	750	1052	nd	2	100	100	174	44%	Y-25%	y	y-nd	y-nd	nd
LA	149*	7721	1943	2	37	49	171	16%	Y-50%	y	n	n	20%
ME	228	3478	2500	>1	39	72	72	29%	Y-10%	y	y	y-90%	5%
MD	32*	3190	1939	9	66	70	507	12%	Y-100%	y	n	n	nd
MA	182	1519	1200	11	45	75	1272	5%	Y-77	y	y	y-nd	nd
MI	0	3224	nd	nd	55	50	154	-5%	Y-nd	y	y-nd	y-nd	30%
MS	44*	359	247	15	4	12	192	30%	Y-41%	n	n	n	30%
NH	18*	131	40	5	12	32	331	67%	Y-70%	y	n	y-30%	78%
NJ	125*	1792	469	26	76	90	1219	6%	Y-100%	y	n	n	74%
NY	125* (b)	1850	638	47	37	84	858		Y-100%*	y	y	y	nd (b)
NC	320*	2625	3661	15	19	11	75	-3%	Y-100%	y	n	n	nd
NM	184*	206	nd	nd	100	100	236	255%	Y-nd	n	y	y-nd	nd
OR	362*	1410	500	13	20	38	82	46%	Y-72%	y	y	y-28%	58%
PA	0	140	nd	nd	4	25	1701	-9%	Y-19%	n	y-81%	n	20%
PR	311	700	nd	nd	12	100	856	30%	Y-50%	y	y	y-nd	nd
RI	40	384	340	7	100	100	950	6%	Y-68%	y	y	y	nd
SC	181*	2876	3063	2	26	24	114	57%	Y-100%	y	n	n	42%
VI	nd	175	nd	nd	100	100	771	63%	Y-nd	?	y	y-nd	nd
VA	200*	3315	993	26	22	62	423	40%	Y-100%	y	n	n	nd
WA	171	3026	2337	>1	31	70	172	46%	Y-35%	y	y	y-65%	nd
WI	0	820	nd	nd	19	39	177	0%	Y-10%	y	y-72%	y-8%	nd
Total	nd	85770	31513***	nd	--	44	--	--	Y-29	Y-21 n8	Y-18 n11	Y-17 n12	nd

KEY and SOURCES:

- \* denotes where state coastline miles data differs from General Coastline miles data in US DOC, NOAA 1975. The Coastline of the United States
- \*\* New York- Atlantic Ocean only covered under this study. \*\*\* Does not include the Great Lakes States or the island Territories and Commonwealths.
- (a) CT has no open ocean coastline. Data covers Long Island Sound (b) New York data covers open ocean coastline only. Great Lakes shoreline not included here.
- nd- no data available ?- unknown
- (1) Individual State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores
- (2) US DOC, NOAA. 1975. *The Coastline of the United States*.
- (3) USACE. 1970. *National Shoreline Study*.
- (4) Coastal Ocean Policy Roundtable, The 1992 Coastal Status report. A Pilot Study of the US Coastal Zone and its Resources, Tables 2 and 3.
- (5) US DOC, NOAA, NOS. 50 Years of *Population Change Along Our Nation's Coasts 1960-2010*.
- (6) Individual State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores
- (7) Individual State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores

**Table 2: Coastal Shoreline Erosion - Percent Eroding By State**

State	National Shoreline	% Critically Eroding Eroding Miles	Significantly Eroding Miles
Alabama	352	9%	41%
Alaska	47300	>1%	11%
Am. Samoa	---	---	---
California	1827	4%	85%
C.N. Marianas	---	---	---
Connecticut	270	9%	89%
Delaware	226	12%	26%
Florida	6265	5%	16%
Guam	---	---	---
Hawaii	930	3%	12%
Louisiana	1943	2%	82%
Maine	2500	>1%	99%
Maryland	1939	9%	86%
Massachusetts	1200	11%	97%
Michigan	---	---	---
Mississippi	247	15%	43%
New Hampshire	40	5%	95%
New Jersey	469	26%	49%
New York	638	47%	100%
North Carolina	3661	15%	35%
Oregon	500	13%	33%
Pennsylvania	---	---	---
Puerto Rico	---	---	---
Rhode Island	340	7%	98%
South Carolina	3063	2%	8%
Virgin Islands	---	---	---
Virginia	993	26%	56%
Washington	2337	>1%	4%
Wisconsin	---	---	---
Great Lakes	3680	6%	34%

Sources: U.S. Army Corps of Engineers. 1971. The National Shoreline Study.

Notes:  
Critically Eroding Areas- areas where action to halt erosion may be justified based on rate of erosion and presence/level of threatened development.  
Significantly Erosion Area- areas where erosion occurring but development not threatened  
Study did not cover Island Territories and Commonwealths or Great Lakes States.

**Table 3: US Army Corps of Engineers Major Shoreline Protection Projects in CZM States 1950-1993**

Table 6. U.S. Army Corps of Engineers and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers. (Adapted from Tables 13, 14, 16, 18, 19 and Appendix D)									
Initial Beach Renourishment		Periodic Beach Nourishment		Structures		Emergency Projects		Total Projects	
# Projects/Est. Cu Yds/Act. Exp.	# Projects/Est. Cu Yds/Act. Exp.	# Projects/Est. Cu Yds/Act. Exp.	# Projects/Est. Cu Yds/Act. Exp.	# Projects/Act. Exp.	# Projects/Act. Exp.	# Projects/Act. Exp.	# Projects/Act. Exp.	# Projects/Act. Exp.	Total Projects
CA	5 14448 \$ 23942	2 5800 \$36813	5 \$ 6144	1 \$ 473	13				
CT	3 1435 \$ 1882	3 889 \$ (1)	2 \$ 169	0 \$ 0	8				
DE	1 0* \$ 0	1 700 \$ 813	1 \$ 1876	1 \$ 88	4				
FL	15 34804 \$147764	11 14731 \$68273	6 \$ 9797	1 \$3217	33				
LA	1 2540 \$ 10534	1 1520 \$ 7571	1 \$ 284	1 \$4688	4				
MD	1 3825 \$ 23290	1 184* \$ 685	1 \$ 5919	1 \$2335	4				
MA	3 1325 \$ 4664	2 285 \$ (1)	2 \$ 745	0 \$ 0	7				
MS	1 5700 \$ 856	1 3350* \$ (1)(a)	1 \$ 736	0 \$ 0	3				
NH	2 540 \$ 956	1 931 \$ (1)	2 \$ 190	0 \$ 0	5				
NJ	4 9131 \$36781	4 1842 \$ 4561	4 \$24860	0 \$ 0	12				
NY	3 37995 \$ 29875	3 5585 \$53386	3 \$ 6642	1 \$1750	10				
NY-GL	1 244 \$ 1178	1 70 \$ 0	1 \$ 1200	0 \$ 0	3				
NC	3 4651 \$ 1606	3 6653 \$22351	2 \$ 948	2 \$2529	10				
PA	1 4400 \$ 5692	1 4017 \$24637	1 \$18723	0 \$ 0	3				
RI	0 0 \$ 0	0 0 \$ 0	1 \$ 1361	0 \$ 0	1				
SC	1 2500 \$ 7184	0 0 \$ 0	1 \$ 1609	0 \$ 0	2				
VA	0 0 \$ 0	1 1875 \$12800	0 \$ 0	1 \$ 560	2				
Total	45	36	34	9	124				

Source: U.S. Army Corps of Engineers, Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers. (Adapted from Tables 13, 14, 16, 18, 19 and Appendix D)

KEY: Est. Cu. Yds- Estimated Cubic Yards of Sand Placed on Beach(000 cu.yd.)      Act. Exp.- Actual Expenditures for Projects (\$000's)

Federal/Non-Federal)

(1) Actual Costs for project not available. Estimated Costs of projects for CT- \$889; MA-Not Available; NH-\$931

(1)(a) All non-federal costs and no record kept by COE.

Note regarding COE involvement with Coastal States, Territories, Commonwealths

16 CZM-Approved States with COE Shoreline Protection Projects (Listed Above)

8 CZM States with Continuing Authorized Projects for Beach Erosion Control: CA, CT(3), DE, MD, VA, HI, AS, WA

2 CZM-Approved States with other COE Erosion Control Projects: AK-Under construction; Puerto Rico-Deauthorized project

23 CZM-Approved States with COE Dredging Projects 90-93

25 CZM-Approved States with one or more COE Projects (protection, dredging, etc).

4 CZM-Approved States with No COE Projects: ME, Guam, CNMI, UV.

Source: U.S. Army Corps of Engineers, Shoreline Protection and Beach Erosion Control Study: Phase 1: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers. (Adapted from Tables 13, 14, 16, 18, 19 and Appendix D)  
 KEY: Est. Cu. Yds- Estimated Cubic Yards of Sand Placed on Beach(000 cu.yd.) Act. Exp- Actual Expenditures for Projects (\$000's  
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(1) Actual Costs for project not available. Estimated Costs of projects for CT- \$889; MA-Not Available; NH-\$931

(1)(a) All non-federal costs and no record kept by COE.

\* Actual Cubic Yards

Note regarding COE involvement with Coastal States, Territories, Commonwealths

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25 CZM-Approved States with one or more COE Projects (protection, dredging, etc).

4 CZM-Approved States with No COE Projects: ME, Guam, CNMI, UV.

**Table 4: Upton-Jones Coastal Claims Summary (as of 2/20/96)**

Coastal State	Claims Filed	Claims Approved	Claims Denied	Total Amount of Approved Settlement
Approved CZM Programs				
CA	2	1	0	\$ 58,900
DE	4	3	0	\$ 35,605
FL	19	10	3	\$ 690,958
LA	5	3	1	\$ 37,618
MA	51	32	15	\$ 2,361,667
MD	2	2	0	\$ 142,128
MI*	47	32	9	\$ 1,084,727
MS	1	1	0	\$ 44,678
NC*	356	262	21	\$14,715,911
NJ*	1	0	1	\$ 0
NY	24	10	10	\$ 748,939
PA*	36	23	3	\$ 1,193,114
RI	4	3	0	\$ 89,220
SC*	15	9	2	\$ 1,612,638
VA	16	8	3	\$ 695,011
WA	20	12	5	\$ 181,687
Subtotal	603	411	73	\$23,692,801
Not In CZM Program				
IN	1	0	0	\$ 0
MN	1	1	0	\$ 20,714
OH	22	17	4	\$ 813,605
TX	17	5	10	\$ 125,765
Subtotal	44	23	16	\$ 960,084
TOTAL	644	434	87	\$24,652,885
Coastal Claims Approved		434		
Demolition - 73%				
Relocation - 27%				
Coastal Claims Denied		87		
In Erosion Zone, Not Condemned		43		
Not in Erosion Zone, Condemned		4		
Not in Erosion Zone, Not Condemned		24		
No Coverage		16		
Coastal Claims Withdrawn		34		
Coastal Claims Pending		87		
Total		645		
* The 5 states with state certification authority from FEMA under this program.				
For all other states, claim applicants submit directly to FEMA.				
Source: Mark Crowell, FEMA, Upton-Jones Data Base. 500 C Street, Room 444, Washington DC 20472 phone: 202-646-3432				

**Table 5: DOI- Coastal Barrier Resource System**

<u>State</u>	<u># Units</u>		<u>Total Acreage</u>	<u>Shoreline Length( miles)</u>
	Private	O. Protected*	Not Including	Otherwise Protected Units
Maine	28	5	4,812	23.4
Massachusetts	61	10	67,410	122.3
Rhode Island	21	5	11,116	33.0
Connecticut	25	3	9,180	22.7
New York	80	10	64,731	104.0
New Jersey	9	7	8,096	10.4
Delaware	4	4	6,945	17.5
Maryland	38	12	7,163	28.0
Virginia	50	12	47,930	77.0
North Carolina	9	7	35,229	43.0
South Carolina	15	6	98,184	60.2
Georgia	6	5	64,407	19.9
Florida	67	39	285,146	189.3
Alabama	4	4	11,381	19.6
Mississippi	6	1	5,981	12.8
Louisiana	17	4	351,738	178.0
Texas	17	8	195,992	175.9
Puerto Rico	41	22	20,196	51.1
Virgin Islands	24	11	3,793	14.6
Ohio	10	0	4,792	8.1
Michigan	46	0	18,689	55.2
Wisconsin	7	0	1,958	7.6
Minnesota	1	0	940	3.0
Totals	582	173	1,325,809	1,276.6

\* Otherwise Protected Areas in Public Ownership

Source: US Fish and Wildlife Service, Adapted from Table December 22, 1992.

## **APPENDIX B: METHODOLOGY & SURVEY INSTRUMENT**

### **APPENDIX B-1: METHODOLOGY**

#### **RESEARCH QUESTION**

The basic research question utilized is "how effective overall have the individual and collective state CZM program efforts been in addressing protection of beaches, dunes, bluffs and rocky shores?"

**What is Covered and What is not Covered:** This section covers oceanfront beaches, dunes, bluffs and rocky shores. It also covers the same resources along the shoreline of the Great Lakes. It is limited to the twenty-nine coastal states, territories and commonwealths with approved coastal programs as of 1995.

**What is not Covered:** *"Barrier islands"* and *"coral reefs"* were not studied as distinct natural coastal features, although, some states employ management tools to specifically address their protection. Likewise *"coastal hazard areas"* and management tools employed exclusively to minimize hazard risks were not addressed in this study including state participation in the NFIP; hurricane preparedness, evaluation, mitigation and post-disaster redevelopment tools. However, because state protection of beaches and dunes and eroding bluff areas is often tied to coastal hazard risks, several tools which overlap these issue areas were part of this study. They include regulatory tools for structures and shoreline stabilizations; beach, dune, and bluff erosion management plans; dune restoration, beach nourishment; armoring repair programs; public investment restrictions and incentives for beach and dune protection. States participation in Upton-Jones portion of the NFIP is referenced, since it involves the removal or relocation of structures rather than building standards within beach/dune areas. Many states regulate coastline development and stabilizations based on public access and visual access considerations. This study only covers state CZM regulations which limit public access in order to protect natural resources. Likewise, *"dredging and dredged material disposal"* policies and management tools are not covered except when such material is disposed on beaches as nourishment. Federal consistency and intergovernmental coordination tools are also not expressly part of this study. In addition, the New York CZM program in the Great Lakes was not addressed.

#### **RESEARCH OBJECTIVES**

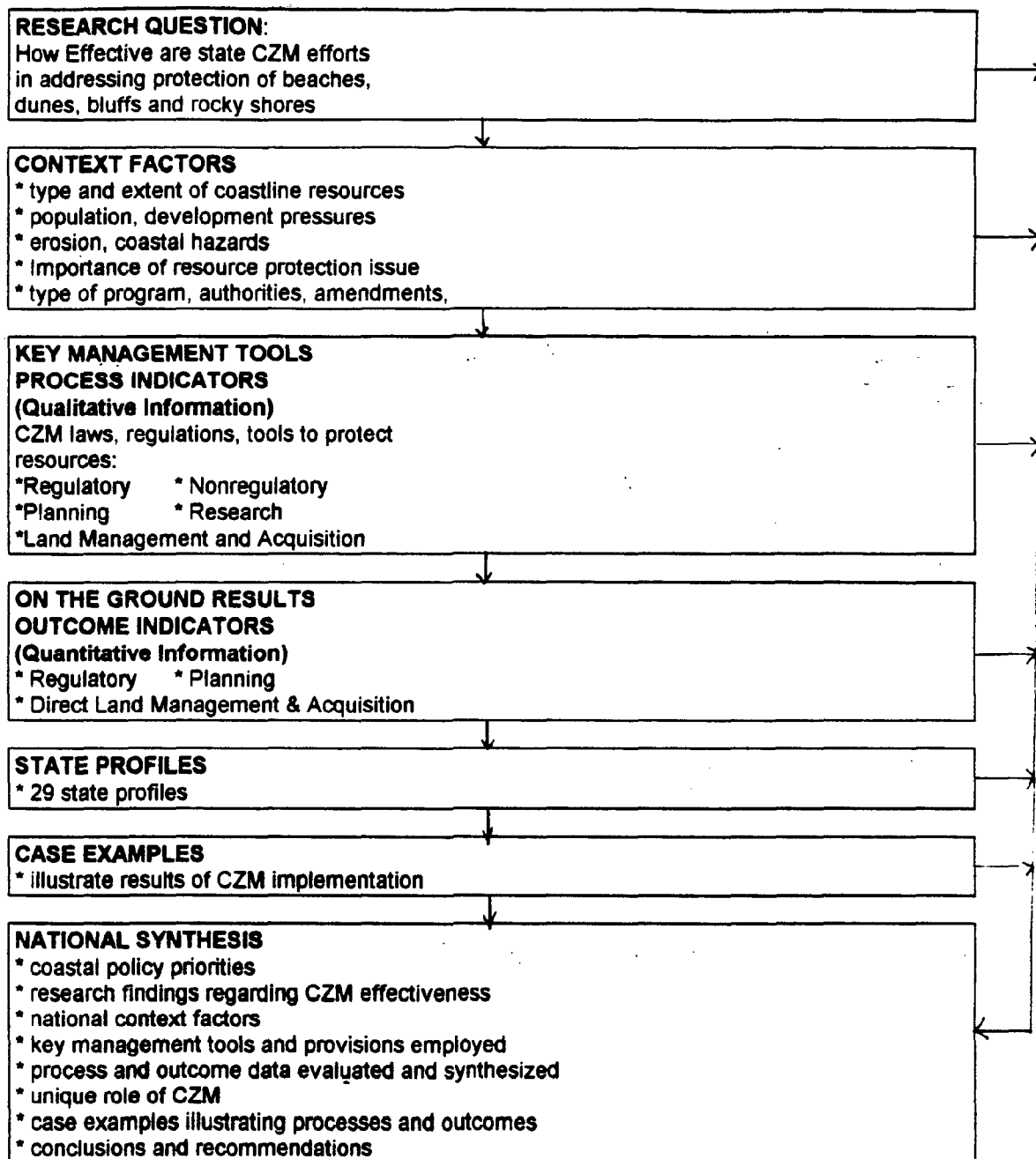
1. Describe the management tools developed, refined and employ to protect beaches, dunes, bluffs, rocky shores;
2. Describe the on-the-ground outcome after implementation of the CZM tools;
3. Determine the effectiveness of state CZM programs in achieving the national policy objective to protect beaches, dunes, bluffs and rocky shores by linking tools and outcomes.
4. Identify the role of federal and state CZM programs in achieving the outcomes; and
5. Identify and recommend improvements related to monitoring guidelines, performance measures, technical or information services.

#### **RESEARCH DESIGN**

**A. Model for Evaluating Effectiveness.** The overall research framework is described in the introduction to the entire study. However, a model of the method used to evaluate the effectiveness of state CZM programs in addressing protection of beaches and dunes, bluffs and rocky shores is shown in Figure 1.



**Figure 1: Method used for evaluating effectiveness of state CZM programs in addressing protection of beaches and dunes, bluffs and rocky shores**



**B. Data Collection:** A specific survey instrument was developed for collecting information on tools employed (process data) and on-the-ground results of program implementation (outcome indicator data) on the protection of beaches, dunes, bluffs and rocky shores. This survey instrument was mailed, faxed or emailed to all twenty-nine CZM states. In addition, the instrument was used in completing phone interviews with state contacts. It also served as the basis for completion of individual state CZM profiles. (See Appendix B-2 for a copy of the Survey Instrument)

In addition, the authors reviewed and selected information from state CZM documents including Final Environmental Impact Statements (FEIS); 309 Assessment and Strategy Reports; and state laws and regulations pertaining to resource protection. Where provided by OCRM or the coastal state, the authors reviewed documents related to beach and dune protection, state coastal parks, land acquisitions, and selected state CZM progress reports, annual reports, and 312 evaluation reports.

Follow-up phone interviews and data requests were made to each coastal state, usually to multiple state agency or bureau staff. It was typical to contact more than one staff in the state CZM program office, the state land management agency, a state environmental regulatory agency, the state land acquisition agency, and the state wildlife protection agencies.

The information collected for each of the 29 coastal states was placed in the individual state CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores. This draft profile was sent to each state for review, and sometimes to OCRM regional staff for review, and then finalized.

### **C. Definitions**

"Process Indicators" are the specific management programs, tools or techniques that states have developed to address coastal problems. Examples include key provisions of regulatory programs such as coastal setbacks from primary dunes or control zones which protect natural functions of resources; plans with enforceable policies that address beach renourishment, inlet management, dune restoration or special area resource protection; state land management of coastal parks which guide access or protect unique habitat areas; and acquisition programs to purchase beaches, dunes, bluffs or rocky shore areas.

"Outcome Indicators" are the specific on-the-ground effects that result from implementation of CZM programs, tools, and techniques. Examples include linear and/or area data on permits issued reflected in miles of beachfront shoreline developed or armored through permitting; area restricted from vehicular access through access plan and regulations; miles of coastal shoreline and acres in state land management or protection status; miles of beaches restored or dunes revegetated; miles and/or acres of coastal shoreline acquired for resource protection.

"CZM Program Effectiveness" means the special role of CZM in using process tools to affect outcomes sought under the CZMA, namely the protection of natural beaches, dunes, bluffs and rocky shores. Effectiveness is measured by: 1) process indicators (tools) and outcome indicators (results) and their linkage within each of the 29 state programs; 2) state CZM program implementation through case examples where no statewide data is available; and 3) the unique role of CZM as only one of many government and non-government agencies involved in coastal management.

"Natural Resources of the Coastal Zone" means watersheds, lakes and rivers, associated floodplains and wetlands, estuaries, beaches and dunes, barrier beaches, offshore coral reefs, and the wildlife, fish and other aquatic life that depends on these environments are part of a larger, integrated coastal nearshore ecosystem.

"Natural Resources" under this section means beaches, dunes, bluffs and rocky shores. State definitions for these resources, however, vary particularly with regard to the inland extent of the resource jurisdiction.

"Resource Protection Values" means the priority natural values a state gives to a certain resource. For example, some states establish conservation or preservation zones within which natural resources are afforded more protection than within a recreation or development zone. Likewise, some states identify certain species or habitat as having high protection value such as threatened or endangered species habitat areas.

"Management Tools Employed" means the processes, tools and techniques which a state CZM program has identified in their FEIS document and OCRM has approved as part of the state's CZM program that affect protection of beaches, dunes, bluffs and rocky shores.

An example of a management tool is the "setback law". This study looks at the key provisions and their long-term effects. State setback laws require new structures to be built at a specified distance from the mean high water line, a dune line or some other definable point. The setback distance is usually defined as either an "arbitrary distance" in feet (e.g., 50 feet, 100 feet) or a distance in feet determined by the average annual "erosion rate" multiplied by a specific number of years (e.g., average annual erosion rate at 2 feet x 30 years = 60 foot setback). The arbitrary distance method creates a need to reestablish the mean high tide line, or other measurement point frequently. The erosion rate method is intended to allow normal erosion and avoid erosion threats to a structure during its usable lifetime. However, state laws define the normal useful life of a frame dwelling structure as 30 years, where in reality it is closer to 70 years and, in some coastal areas, the current annual erosion rate exceeds the long-term historical rate placing structures in harms way even sooner. Along our nation's high erosion areas, beaches and shorelines are washing away and the long-term effects, using either setback method, are homes toppling into the ocean or armored shorelines.

#### **D. Grouping of State Management Tools for Beach, Dune, Bluff and Rocky Shore Protection.**

An initial analysis of the 29 coastal states/territories and their legal authorities to protect beach, dune, bluff and rocky shore resources demonstrated a great diversity in approaches. Each state's particular physical, social and economic environment is reflected in that state's priorities, laws, regulations and other implementing management tools. This makes it difficult to compare diverse state approaches and the effectiveness of their management tools.

To facilitate comparisons for this research, common state management approaches to protecting beach and dune resources, bluffs and rocky shores are grouped together. This grouping makes it possible to analyze similar state management tools and to develop a national perspective on the utilization of major management tool in addressing beach and dune, bluff and rocky shore protection.

State coastal management tools utilized for the protection of *beaches and dunes* are grouped and analyzed within the following six major categories: 1) Regulatory Tools; 2) Planning Tools; 3) Direct Land Management Tools; 4) Acquisition Tools; 5) Nonregulatory Tools; and 6) Research Tools.

Each of these categories have sub-groupings of more precisely delineated management tools and key provisions. This was necessary, again, in order to identify and compare similar management approaches and tools among state programs. The following is a list of the tool categories and subtools employed:

**\* Regulatory Tools:**

- 1.1. Distance inland regulations apply
- 1.2. Activities regulated and exceptions
- 1.3. Restrict new construction and rebuilding through a) setback, b) controls zones, c) exceptions
- 1.4. Restrict new and repair/rebuilding of shoreline stabilization structures and exceptions,
- 1.5. Restrict pedestrian access
- 1.6. Restrict vehicular access/traffic

- 1.7. Protect beach/dune habitat of value to marine life
- 1.8. Other restrictions or conditions affecting dune creation, revegetation, sand fencing, sand scraping, dune reshaping, near shore mining, etc.
- 1.9. Local delegation of permit responsibilities
- 1.10. Permit compliance and computerized permit tracking system

**\* Planning Tools**

- 2.1. Local planning and/or regulation
- 2.2. Special Area Management Plans
- 2.3. Other adopted plans- such as erosion control, inlet management, land and water use plans

**\* Direct Land Management, Restoration and Acquisition Tools**

- 3.1. Shoreline in state park management
- 3.2. Natural areas protected
- 3.3. Boardwalks, dune cross-overs & access restrictions
- 3.4. Dunes creation or restoration program
- 3.5. Beach renourishment program
- 3.6. Shoreline armoring and repair program
- 3.7. Coastal lands acquisition program

**\* Nonregulatory Tools**

- 4.1. Public investment restrictions
- 4.2. Public investment incentives
- 4.3. Coastal property disclosure
- 4.4. Education, outreach and technical assistance
- 4.5. Financial assistance

**\* Research Tools**

- 5.1. Methodologies for establishing setbacks, control zones
- 5.2. Beach profiles
- 5.3. Natural areas inventories
- 5.4. Technical reports
- 5.5. Aerial photography
- 5.6. Sea level rise considerations

Existing **state management tools** utilized to protect **bluff** resources and likewise **rocky shore** resources have been identified, grouped and analyzed within six major categories: 1) Regulatory Tools; 2) Planning Tools; 3) Direct Land Management Tools; 4) Acquisition Tools; 5) Nonregulatory Tools; and 6) Research Tools.

For **bluffs** and **rocky shores**, these six categories have sub-groupings of management tools to facilitate comparative analysis, as follows:

**\* Resource Present**

1. Bluffs
2. Rocky Shores

**\* Regulatory Tools**

- 1.1. Restrict construction
- 1.2. Other regulatory controls

**\* Planning Tools**

- 2.1. Local
- 2.2. State
- 2.3. Special area management
- 2.4. Other

\* Direct Land Management Tools

3.1. State owns and manages

3.2. natural areas protected

\* Acquisition Tools

4.1. Lands acquired

\* Nonregulatory Tools

5.1. Public investment restrictions

5.2. Coastal property disclosure

5.3. Education, outreach and technical assistance

5.4. Financial assistance

\* Research Tools

6.1. Inventories/designate protection areas

6.2. Technical reports

Due to the paucity of on-the-ground outcome data, indicators of program effectiveness were developed using the tools states employ and key provisions which are assumed to ensure greatest protection of resources. See below.

**E. Analysis and Linkage of Process and Outcome Indicators and Determination of Effectiveness in Protecting Beach, Dune, Bluff and Rocky Shore Resources.**

The author has expressed certain underlying *assumptions* and developed certain *process* and *outcome indicators or measures of effectiveness* for management tools employed to protect beaches, dunes, bluffs, and rocky shores. These are summarized as follows:

**Regulatory Programs**

Assumption: *Regulatory programs*, depending on their purpose and design, can provide on-the-ground protection of beach and dune systems. The level of protection they provide varies depending on the jurisdictional area covered, the types of prohibitions and limitations placed on activities within the jurisdiction, exception/variances allowed, level of enforcement and penalties for violations. coastal laws with setbacks from beach and dune systems offer significant protection, provided there are no major exceptions such as single family homes seaward of the jurisdiction. Coastal laws with control zones within which activities are regulated tend to allow but try to minimize negative impacts on beach and dune resources. Most types of shoreline armoring impede natural sand migration, cause erosion and result in the loss of natural beach. States which restrict the use of shoreline armoring structures protect natural beaches, dunes and bluffs. Coastal laws which require and regulate beach access, dune cross-overs, pedestrian and vehicular access, protect beach and dune vegetation/stability. Coastal laws which identify, designate and protect wildlife habitat through permit restrictions protect those specific sections of beach/dune; however such regulated areas tend to be small areas and restrictions are seasonal for bird or turtle nesting sites.

Effectiveness: For regulatory tools employed by states to protect beach, dune, bluff and rocky shore areas:

1) "process indicators of effectiveness" include:

(a) mandatory setbacks for development and redevelopment from beaches, dunes, bluffs, rocky shorelines; the farther setback the more effective and the fewer exceptions allowed within the setbacks, the more effective.

- (b) control zones along the shoreline which restrict construction on the beach and dunes, steep slope bluffs, erodible bluffs, rocky shores; the more restrictive, the more effective.
- (c) restrictions on shoreline stabilization structures; the more restrictive, the more effective.
- (c) restrictions on pedestrian and vehicular access.
- (d) restriction on the use of habitat areas.
- (e) permit tracking system.
- (f) enforcement program.

2) "outcome indicators of effectiveness" include:

- (a) no new permits for shoreline structures or shoreline stabilizations on the beach/dune system.
- (b) decreases in the number of permits issued or violations cited for shoreline structures and shoreline stabilizations over time.
- (c) permits issued for demolition and/or landward relocation of beachfront structures.
- (d) permit restrictions on size, location, design of structure or stabilization to minimize adverse impacts on natural beach/dune system.
- (e) permits issued for beachfront boardwalks/dunes cross-overs.
- (f) areas/acres/shoreline miles restricted from pedestrian or vehicular access.
- (g) areas/acres/shoreline miles designated protected areas as endangered species habitat, etc. where development restrictions apply.

### **Planning Programs**

**Assumption:** *Planning programs*, when combined with implementation through local land use regulations, zoning and subdivision ordinances and other actions, can provide on-the-ground protection of beach and dune resources. The level of protection the planning programs provide varies depending on the extent of the resource covered by the plan; the type of protection policies, standards and provisions; and specified exemptions and variances.

**Effectiveness:** For planning tools employed, states to protect beach, dune, bluff and rocky shore areas:

1) "process indicators of effectiveness" include:

- (a) number of approved plans: state beach/dune, rocky shore, bluff management plans; local coastal land use plans; SAMPS, etc. that protect resources.

2) "outcome indicators of effectiveness" include:

- (a) areas/acres/shoreline miles designated by enforceable state or local plans, SAMPS, or other designations as protection/conservation/limited use areas which are enforced through zoning or other protective ordinances/regulations.

### **State Ownership and Direct Land Management**

**Assumption:** *State ownership and management* of state-held lands along the coast can afford a high level of natural resource protection, depending on competing use demands placed on such lands. State lands developed for recreational use, such as beachfront parks, can also protect natural resources if management plans are adopted and implemented which restrict pedestrian and vehicular access, set aside fragile habitat from human use, and employ other methods to maintain the natural landforms. Protection also varies depending on priority uses given to such state holdings. Those lands with wildlife preserves or conservation areas generally affording more restrictions on uses than state parks and recreation areas.

The installation of boardwalks and dune cross-overs serve to protect natural dunes through vegetation stabilization and breach avoidance. Dune creation and restoration through sand fencing and dune revegetation serves to stabilize and rebuild dune areas, limit breaching during coastal storms, and recreate natural dune systems. Beach renourishment has become popular as a tool to artificially create or recreate a beach area through the importing of compatible sand.

The position of NOAA is that "...while beach nourishment may indeed, under certain circumstances, be a technically viable alternative, there are many other considerations that must be deliberated prior to supporting this approach to erosion management...include(ing) the role of beach nourishment in inducing development in high hazard areas, ....other erosion management approaches, whether beach nourishment is economically justified, appropriate cost-sharing, and the environmental issues..." ( MEMO March 19, 1996. NOAA Position on the National Academy of Sciences' Report "Beach Nourishment and Protection." For this study, if a state employs beach nourishment, it is considered a positive impact on protecting natural beach/dune systems. However, the author agrees that unconditioned use of beach nourishment may indeed adversely affect natural systems and may not be the most suitable management approach to protect natural beach/dune areas.

Armoring and armoring repair through construction of shoreline stabilization structures acts to accelerate the loss of sandy beaches. (Platt. Coastal Erosion: Has Retreat Sounded). For this study, if a state employs armoring on state beaches, it is considered a negative impact on natural beach/dune systems.

The identification, designation and protection of natural resource areas within beach/dune systems functions to sustain the natural habitat conditions and values present and provide long-term protection. However, to the extent that such protection is seasonal, such as temporary turtle or bird nesting site fencing, pedestrian access over such areas at other times of year may destroy the habitat values long-term.

Effectiveness: For direct land management tools employed by states to protect beach, dune, bluff, and rocky shore:

1) "process indicators of effectiveness include:

- (a) number of state beachfront parks
- (b) number of park management plans
- (c) policies prohibiting use of shoreline stabilizations
- (d) number of natural areas protected

2) "outcome indicators of effectiveness" include:

- (a) presence of state parks/coastline holdings that contain beaches and dunes, bluffs and rocky shores as measured by acres, linear shoreline miles covered, coastline in public ownership/state ownership; the more coastline in state parks the more effective.
- (b) number of boardwalks/dune cross-overs installed on state park lands.
- (c) dune revegetation projects, acres and shoreline miles involved, state funds.
- (d) beaches restored/renourished measured in cubic yards, beachfront miles, state funds.
- (e) natural resource protection areas as measured by number, acres, coastline acres/miles within these state parks for sea turtle nesting sites, sea bird or shorebird nesting sites, other protected species, or restricted from pedestrian and vehicular public access through limitations on use or fencing, vehicular access restrictions, etc.

### **Acquisition**

Assumption: *Acquisition programs* place private lands into public holdings. Along the coast, these acquisitions tend to serve both recreational use demands, as well as some resource protection goals. Acquisition of large resource systems or acquisition of lands adjacent to existing holdings can afford improve natural resource protection opportunities.

Effectiveness: For state land acquisition tools employed by states to protect beach, dune, bluff and rocky shore areas:

1) "process indicators of effectiveness" include:

- (a) state acquisition program which includes coastal land acquisition component.
- (b) multiple acquisition tools employed- fees, trades, etc.
- (c) acquisition expenditures.

2) "outcome indicators of effectiveness" include:

- (a) amount of land on coastline acquired, acreage, beachfront and coastline miles; the more land acquired for natural resource protection, the more effective.
- (b) Increase in amount and percent of coastline in state ownership.

#### **Nonregulatory Tools and Research Tools**

**Assumption:** Nonregulatory and research tools support the four management tools discussed above. For example, education and technical assistance to local governments functions to improve local coastal planning and regulation. Likewise, research such as shoreline erosion rates functions to improve state regulatory controls over development in erosion prone areas.

**Effectiveness:** No attempt was made to collect outcome indicator data for these two types of management tools employed.

#### **F. Suite of Tools Employed and Competing Policy Priorities**

States with the following suite of regulatory, planning, direct land management and acquisition provisions are presumed to have effective oceanfront resource protection programs:

##### **Regulatory Programs**

- (a) **Coastal Setbacks** for development and redevelopment from beach, dune, bluffs, or rocky shores natural features, with the farther setback the more effective; the fewer exceptions allowed within the setback, the more effective.
- (b) **Coastal Construction Controls Zones** along the shoreline with regulations governing activities affecting beach, dune, steep slope bluffs, erodable bluffs, and rocky shores and limits on size, type, design or location of permitted construction to minimize adverse impacts on beach/dune/bluff systems; controls over new significant activities with few exceptions, control over additions/repairs/rebuilding; the more restrictive, the more effective.
- (c) **Shoreline Stabilization Regulations** which place limitations on the use of shoreline stabilization structures in favor of nonstructural solutions.
- (d) **Access Restrictions** with requirements for boardwalks or dune crossovers to minimize adverse impacts on dune; and areas designated where pedestrian and/or vehicular access is restricted to protect resources.
- (e) **Habitat Protection and Other Controls** over critical habitat areas where uses are restricted to protect habitat protection values.
- (f) **Permit Tracking and Enforcement Provisions** which are used to monitor permits and violations.

##### **Planning**

- (a) **Adopted Plans** for areas containing enforceable policies that address resource protection, beach nourishment, inlet management, dunes restoration, or special area resource protection or conservation; the larger the resource area covered, the more of the shoreline included, and the more restrictive the enforceable policies, the more effective.

##### **State Coastal Land Management and Acquisition**

- (a) **State Coastal Land Holdings** including inventory of the number, acres, shoreline miles of state lands in state oceanfront parks and preserves.
- (b) **State Coastal Land Management and Stewardship** including park management plans; boardwalks, dune cross-crossovers or other guided pedestrian access; dune restoration and beach nourishment where appropriate; enforceable policies restricting the use of shoreline stabilization structures; and designated natural resource habitat protection areas.
- (c) **State Coastal Land Acquisition Program** with coastal land acquisition as a priority



### **Balancing Competing Policy Priorities**

The CZMA and state programs are multi-objective, attempting to accommodate diverse uses competing for limited space along our nation's shorelines. The CZMA requires states to balance competing needs and demands such as protection of properties from hazard risks and promotion of recreational use of the shoreline, as well as protection of natural shoreline resources. As a result, natural resource protection policies are tempered by policies which meet other state and national objectives. Context factors are important, such as development pressures, inappropriate shoreline development and commitment to coastline development which preceded CZM, presence of valued natural resources, natural threats such as erosion, hurricanes, landslides, etc. The suite of tools and key provisions listed above are indicative of states which have developed effective resource programs.

### **G. Unique role of CZM Programs among several CZM agencies.**

A national and state context report was prepared which identifies key federal laws and agencies with coastal management responsibilities and the unique role of the national CZM program in this context. See **Appendix A**

### **H. National Synthesis**

The national synthesis provides a summary of tools states employ, key provisions and relevant outcome data demonstrating protection of beaches, dunes, bluffs and rocky shores. Effectiveness is based on a assessment of coastal policy priorities, context factors, management tools employed, the strength of the key provisions, outcomes linked to tools employed, case examples, and the unique role of CZM in protection of resources and utilization of particular management tools. The cross-state utilization and overall effectiveness of certain tools is discussed, such as setback or control zones. No attempt is made, however, to weight and rank the effectiveness of each coastal state according to the CZM tools it employs and the outcome data it provided.

### **RECOMMENDATIONS**

The fourth objective of this study is to identify and recommend improvements related to monitoring guidelines, performance measures, technical or information services. Recommendations follow directly from lessons learned in conducting this research projects.

### **RESEARCH LIMITATIONS**

Limitations to the research include:

- \* diversity among state CZM programs in geography, sociology, development pressures, organization and policy priorities.
- \* plethora of management agencies involved in coastal area with separate management mandates and lack of coordination.
- \* lack of database at OCRM on state CZM program tools, activities, outcomes.
- \* lack of documentation, bibliographies and dissemination of CZM technical reports and program results, coupled with reliance on case examples and success stories in the absence of statewide data on CZM outcomes.

\* lack of standardized and consolidated reporting in performance evaluations, grants, annual reports which is reflected in an inadequate reporting process between the coastal states and OCRM.

\* Inadequate computerized permit tracking data regarding miles, acres, resources, areas affected, length of projects permitted, and assessment of cumulative impacts of multiple permits.

\* lack of federal standards for measuring state CZM performance coupled with lack of measurable data provided by OCRM and the coastal states.

\* significant changes to state CZM programs over the years which are not documented by OCRM.

\* turn-over among state CZM staff and the lack of institutional memory about CZM activities and results.

\* compounding factors which influence and shape state coastal policies and programs and affect CZM results including economic development, environmental pressures, political and social factors.

\* legal interpretations and decisions affecting coastal management tool implementation.

## APPENDIX B: METHODOLOGY & SURVEY INSTRUMENT

### B-2 SURVEY INSTRUMENT

STATE---Beaches, Dunes, Bluffs, Rocky Shores Protection (1/10/95)

#### BACKGROUND AND CONTEXT

##### ISSUE IN THE STATE

At time of program approval.

Evolution of the Issue:

State Ranking of Issue:

#### CONTEXT FACTORS

Tidal Shoreline Mileage:

Open Coastline Mileage:

Sandy Beaches Coastline:

Dunes-Backed Beaches:

Bluff-Backed Beaches:

Rocky Shores Coastline:

Bluff Coastline w/minimal Beach:

Offshore Rocks and Islands:

Description:

Changes in Resources/Use Patterns:

Coastline Ownership: % Public

Coastline Development: % Developed % Undeveloped ( % public/private)

Coastal Population Growth 1980-1990: % (Major, Moderate, Minimal Impact)(See National Table)

Economic Pressures:

Coastal Erosion Factors:

Critical Coastal Erosion Areas as measured by Miles of Beachfront with annual erosion > 1 ft per year:

Critical Coastal Erosion Areas as measured by Miles of Bluff-Front with annual recession rates > ? per year:

Tidal Inlets:

Inlets with jetties:

Inlets with maintained channels:

Inlet Dredging Projects: (See National Table)

Beachfront Shoreline Armored (miles/% of coast) 19\_\_: 1995:

Bluff Fronts Armored (miles/%):

Beachfronts Renourished: If yes, (See National Table of COE projects)

Major Coastal Storm Events: (See National Table)

#### KEY MANAGEMENT AUTHORITIES AFFECTING PROTECTION OF BEACHES, DUNES ROCKY SHORES, AND BLUFFS

#### MAJOR AMENDMENTS AFFECTING BEACHES AND DUNES, BLUFFS ROCKY SHORES

#### KEY DEFINITIONS

#### CZM PROGRAM POLICIES THAT ADDRESS BEACH AND DUNE PROTECTION

## **TOOLS EMPLOYED TO PROTECT BEACHES AND DUNES**

### **A. REGULATORY TOOLS EMPLOYED**

#### **A-1 Regulatory Program to Restrict Construction on the Beach/Dune Systems**

##### **Local Regulation Delegation**

##### **A-1 Outcome Indicators for Restricting Development on Beaches and Dunes**

Number of state permits for habitable structures in permit jurisdiction 19 -1995:

(Seaward of setback, within permit control zone, etc)

Number of beachfront structures damaged and

- permitted to be replaced/rebuilt 19 -1995:

- not allowed to be rebuilt 19 -1995:

- relocated Landward 19 -1995:

- demolished 19 -1995:

#### **A-2 Regulatory Program to Restrict Shoreline Stabilization Structures**

\* Permit *new* shoreline stabilization structures \* Exceptions

\* Restriction on *reconstruction* of shoreline stabilization structures/shoreline protection devices:

\* Exceptions:

\* Provisions for "emergency repairs" of shoreline stabilizations

##### **A-2 Outcome Indicators for Restricting Shoreline Stabilization Structures**

Number of state permits issued for seawalls, rip rap, other armoring devices between 19 and 1995:

Number of seawalls, rip rap, and other shoreline stabilization structures damaged and

- allowed to be repaired/rebuilt 19 -1995:

- not allowed to be repaired between 19 -1995:

- emergency permits issued 199 -1995:

Number of groins/groin fields permitted : 19 - 1995:

Number of jetties and offshore breakwaters constructed 19 -1995:

#### **A-3 Regulatory Program to Restrict Pedestrian Access and Vehicular Traffic**

\* Construction of beachfront boardwalks/elevated walkways over dunes regulated:

\* Restrictions on vehicular traffic

##### **A-3 Outcome Indicators for Restricting Pedestrian and Vehicular Traffic on Beaches and Dunes**

Number of Beachfront Boardwalks Permitted 19 - 1995:

Areas where access/vehicular traffic has been prohibited/restricted in area and shoreline miles:

#### **A-4 Other Regulatory Permit Restrictions/Conditions Affecting Beach/Dune Protection**

\* Beach/Dune Habitat for Marine Life Regs:

\* Dunes Creation/Revegetation Regs/Sand Fencing:

\* Sand Scraping/Dune Reshaping Regs:

\* Near Shore Sand Mining Regs:

\* Other:

##### **A-4 Outcome Indicators for Other Restrictions Resulting in Beach/Dune Protection**

Number of Areas/Beachfront Miles protected as Turtle Nesting Habitat:

Number of Areas/Beachfront Miles protected as Bird Nesting Habitat:

#### **A-5 Permit Compliance and Permit Tracking System**

- \* Permit compliance tools include.
- \* Permit tracking system

#### **A-5 Outcome Indicators--Violation Corrections**

Number of violations cited and corrected 19\_\_-1995:

### **B. MANAGEMENT PLANS EMPLOYED TO PROTECT BEACHES AND DUNES**

#### **B-1 State Coastal Zone Management Plan**

#### **B-2 State Comprehensive Plan or State Comprehensive Planning Process Requirements**

#### **B-3 Local Beach/Dune Resource Mgt. Plans**

(State guidelines and approval/certification or Voluntary/advisory only; Beach/Dune Resource Protection plans; Local Comprehensive Plan component;; Land use regulations (ordinances, zoning, subdivision regulations, etc.; Inventory of Resources; other)

#### **B-3 Outcome Indicators for Local Beach/Dune Resource Mgt. Plan Results**

Number of local governments with state certified plans/ regulations to protect beach/dune systems and areas/acres covered by local protection plans/regulations and results:

#### **B-4 State Beachfront Management Plans/Erosion Control Plans**

#### **B-4 Outcome Indicators for State Beachfront Management Plan Results**

- area/acres/beachfront covered and protection results:
- Number of COE Sponsored beach restoration projects where state negotiated placement of beach quality sand on down-drift beaches 19\_\_-1995:

#### **B-5 Inlet Management Plans**

#### **B-5 Outcome Indicators for Inlet Management Plan Results**

- area covered and protection results:

#### **B-6 Special Area Management Plans**

#### **B-6 Outcome Indicators for State Special Area Management Plan Results**

- area/acres/beachfront covered and protection results:

#### **B-7 Post Disaster Redevelopment Plans**

#### **B-7 Outcome Indicators for Post Disaster Redevelopment Plans**

- area covered and protection results:

#### **B-8 Other Management Plans for Beach and Dune Protection**

#### **B-8 Outcome Indicators for Other Management Plans for Beach and Dunes Protection**

- Other on the ground indicators of management plan results:

### **C. DIRECT LAND MANAGEMENT/RESTORATION TOOLS EMPLOYED FOR BEACHES AND DUNES**

#### **C-1 State Beachfront/Oceanfront Park Management**

#### **C-1 Outcome Indicators for State Beachfront Parks with Management Plans that designate and protect beach/dune systems**

- percent of beachfront in state beachfront parks:
- areas/acres/beachfront protected:
- public boardwalks installed:

#### **C-2 Natural Resource Areas Protection Program for Public Lands**

**C-2 Outcome Indicators for Designated Natural Resource Protection Areas Under CZMP Management.**  
Number of areas/acres of publicly-owned beach/dune areas restricted from public access and damages and designated natural preserve areas/ habitat protection areas: 19\_\_ : 1995:

**C-3 Dune Creation/Restoration Program**

**C-3 Outcome Indicators for Dunes Revegetated**  
Number of areas/beachfront miles 19\_\_ -1995:

**C-4 Beach Renourishment Funding Program**

**C-4 Outcome Indicators for Beaches Restored/Nourished/Renourished**  
Number of beachfront miles replenished and cubic yards sand placed  
19\_\_ and 1995:

**C-5 Armoring Repair Program**

**C-5 Outcome Indicators for State Funding of Beach Erosion Control**

(a) armoring 19\_\_ -1995:

(b) nourishment 19\_\_ -1995:

**D. ACQUISITION TOOLS EMPLOYED FOR BEACHES AND DUNES**

**D-1 Acquisition Program for Purchase of Beaches/Dunes/Coastal Hazard Areas**

**D. Outcome Indicators for Acquisition of Beaches and Dunes**

**D-1** Number of areas/acres of coastal beaches/dunes acquired for public use/natural resource protection (If acquired in partnership specify with whom) between 19\_\_ and 1995:

**E. RESEARCH FOR BEACHES AND DUNES PROTECTION**

**E-1 Methodologies for Designating Setback or Regulatory Zone**

**E-2 Beach Profiles:**

**E-3 Natural Resource Areas Inventories:**

**E-4 Technical Reports as Base for Mgt:**

**E-5 Aerial Photography:**

**E-6 Sea Level Rise Considerations:**

**F. OTHER KEY MANAGEMENT TOOLS EMPLOYED TO PROTECT BEACHES AND DUNES**

**F-1 Public Investment Restrictions:**

**F-2 Coastal Property Disclosure:**

**F-3 Technical Assistance:**

**F-4 Financial Assistance to Local Governments/Land Owners:**

## **TOOLS EMPLOYED TO PROTECT BLUFFS**

### **A. REGULATORY TOOLS EMPLOYED FOR BLUFF MANAGEMENT**

#### **A-1 Regulatory Program to Restrict Development on Bluffs**

##### **A-1 Outcome Indicators for Restricting Development on Bluffs**

Number of structures permitted & required to be setback from bluffs: 19\_\_-1995:

Number of Cliff/Bluff-front Structures Damaged and

- allowed to be repaired/rebuilt 19\_\_-1995: .....
- not allowed to be rebuilt 19\_\_-1995:
- relocated Landward 19\_\_-1995:
- demolished 19\_\_-1995:

#### **A-2 Regulatory Program to Restrict Shoreline Stabilization Structures Used in Bluff Protection**

##### **A-2 Outcome Indicators for Restricting Shoreline Stabilization Structures That Protect Bluffs (See IV.A-2)**

#### **A-3 Bluff Erosion Control Regulations**

- \* Engineering Standards \* Geotechnical Studies \* Siting Standards: \* Revegetation Regs:
- \* Ground Water Controls

##### **A-3 Outcome Indicators for Bluff Erosion Control**

- areas covered and results:

#### **A-4 Pedestrian and Vehicular Traffic, Shoreline Stairs & Access Controls**

##### **A-4 Outcome Indicators for Restrictions on Pedestrian and Vehicular Traffic, Shoreline Stairs, and Access to Shoreline**

- Number of permits issued for stairs and other shoreline access:
- Areas where vehicular traffic is restricted/prohibited:

#### **A-5 Permit Compliance and Permit Tracking Program**

- \* Permit Compliance Program includes
- \* Permit Tracking Program

##### **A-5 Outcome Indicators --Violation Corrections**

Number of violations cited and corrected 19\_\_-1995:

## **B. MANAGEMENT PLANS EMPLOYED FOR BLUFF PROTECTION**

### **B-1 Bluff Management Plans**

### **B-2 Special Area Management Plans**

#### **B-1 and B-2 Outcome Indicators for Bluff Management Plan/Special Area Management Plan Results** Bluffs areas protected in acres/shorefront miles:

### **B-3 Local Bluff Protection Plans/Regulations as part of state CZMP**

#### **B-3 Outcome Indicators for Local Bluff Protection Plans/Regulations**

Number of local governments with state certified plans/ regulations to protect bluffs and areas/acres protected:

## **C. DIRECT LAND MANAGEMENT/RESTORATION TOOLS EMPLOYED FOR BLUFF MANAGEMENT**

### **C-1 Public Owns Bluffs:**

#### **C-1 Outcome Indicators for Public Ownership of Bluffs- % public**

### **C-2 Bluff Park Management:**

#### **C-2 Outcome Indicators for Bluff Park Management**

Number of bluff state parks:

**C-3 Natural Areas Protection of Bluffs in Public Ownership:**

**C-3 Outcome Indicators** for Designated Natural Resource Protection Areas Under CZMP Management:

Number of areas/acres of publicly-owned bluffs restricted from public access and damages and designated natural preserve areas/ habitat protection areas: 19\_\_ : 1995:

**D. ACQUISITION TOOLS EMPLOYED FOR BLUFF PROTECTION**

**D-1 Acquisition Program or other Acquisition Techniques for Bluffs**

**D-1 Outcome Indicators** for Acquisition of Bluffs

-Number of areas/acres of coastal shoreline bluffs acquired for public use/natural resource protection (If acquired in partnership specify with whom) between 19\_\_ and 1995:

**E. RESEARCH FOR BLUFF MANAGEMENT**

**E-1 Inventories of Bluff Resources:**

**E-2 Designation of Bluff Protection Areas:**

**E-3 Technical Reports as Base for Bluff Mgt:**

**E-4 Other:**

**F. OTHER KEY MANAGEMENT TOOLS EMPLOYED FOR BLUFF MANAGEMENT:**

**F-1 Public Investment Restrictions:**

**F-2 Coastal Property Disclosure:**

**F-3 Technical Assistance:**

**F-4 Financial Assistance to Local Governments/Property Owners:**



## **TOOLS EMPLOYED TO PROTECT ROCKY SHORES**

### **A. REGULATORY PROGRAMS EMPLOYED FOR ROCKY SHORES PROTECTION**

#### **A-1 Regulatory Program to Restrict Development on Rocky Shores**

##### **A-1 Outcome Indicators for Restricting Development on Rocky Shores**

Number of structures permitted & required to be setback from rocky shores 19\_\_-1995:

Number of rocky shore front structures damaged and

- allowed to be repaired/rebuilt 19\_\_-1995:

- not allowed to be rebuilt 19\_\_-1995:

- relocated Landward 19\_\_-1995:

- demolished:

#### **A-2 Regulatory Condition To Protect Rocky Shores**

\*Engineering Standards \* Geotechnical Studies \* Siting Standards \* Utilities Controls

A-2 - No Outcome Indicators

#### **A-3 Pedestrian Access Controls**

##### **A-3 Outcome Indicators for Pedestrian Access Control Results**

#### **A-4 Permit Compliance and Permit Tracking System**

\* Permit Compliance Program includes

\* Permit Tracking Program

A-4 Outcome Indicators--Permit Violations Cited 19\_\_-1995:

### **B. MANAGEMENT PLANS EMPLOYED FOR ROCKY SHORES PROTECTION:**

#### **B-1 State Rocky Shore Management Plans:**

#### **B-2 Special Area Management Plans:**

B-1 and B-2 Outcome Indicators for State Rocky Shore Management Plan/ Special Area Management Plans

- areas protected in acres/shorefront miles:

#### **B-3 Local Rocky Shores Protection Plans as part of state CZMP:**

##### **B-3 Outcome Indicators for Local Rocky Shore Protection Plans**

Number of local governments with state certified plans/ regulations to protect rocky shores and acre/acres protected:

### **C. DIRECT LAND MANAGEMENT/RESTORATION TOOLS EMPLOYED FOR ROCKY SHORES:**

#### **C-1 Public Owns Rocky Shores:**

C-1 Outcome Indicators for Rocky Shores in Public Ownership: %

#### **C-2 Rocky Shore Park Management:**

C-2 Outcome Indicators for Rocky Shore Parks

Number of rocky shore state parks:

#### **C-3 Natural Areas Protection of Rocky Shores in Public Ownership:**

C-3 Outcome Indicators for Designated Natural Resource Protection Areas Under CZMP Management:

Number of areas/acres of publicly-owned rocky shores restricted from public access and damages and designated natural preserve areas/ habitat protection areas: 19\_\_: 1995:

### **D. ACQUISITION TOOLS EMPLOYED FOR ROCKY SHORES:**

**D-1 Acquisition Program or other Acquisition Techniques for Rocky Shores:**

**D-1. Outcome Indicator for Acquisition**

- Number of areas/acres of coastal rocky shores acquired for public use/natural resource protection (If acquired in partnership specify with whom) between 19\_\_ and 1995:

**E. RESEARCH FOR ROCKY SHORES PROTECTION**

**E-1 Inventories of Resources:**

**E-2 Designation of Protection Areas:**

**E-3 Technical Reports as Base for Mgt:**

**E-4 Other**

**F. OTHER KEY MANAGEMENT TOOLS EMPLOYED FOR ROCKY SHORES PROTECTION:**

**F-1 Public investment restrictions:**

**F-2 Coastal property disclosure:**

**F-3 Technical Assistance:**

**F-4 Financial Assistance:**

**F-5 Other:**

**CASE EXAMPLES** (Examples that illustrate particularly important and effective management tool in protecting resources or example that shows complexity/competing demands of difficulty in protecting)

**STATE CONTACTS FOR BEACHES/DUNES/BLUFFS/ROCKY SHORES**

**STATE REFERENCES FOR BEACHES, DUNES, BLUFFS, ROCKY SHORES**

State of

\_\_\_\_\_ 309 Assessment

\_\_\_\_\_ 309 Strategy

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

## **APPENDIX C: SUMMARY TABLES**

1: National Context Factors Affecting State Protection of Beaches, Dunes, Bluffs and Rocky Shores

2: Summary of State CZM Programs--year CZM plans approved, year plans amended, management techniques used under CZMA, and primary authorities and tools employed to control land and water uses and protect natural resources (beaches and dunes, bluffs and rocky shores)

3: Summary of State CZM Tools Employed to Protect *Beach/Dune Systems*

4: Summary of State Tools Employed to Protect *Bluffs* and *Rocky Shores*

5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs, and Rocky Shoreline

6: Direct Land Management and Acquisition Tools and Outcomes Associated with State Management of *Beaches, Dunes, Bluffs and Rocky Shores* and Acquiring Additional Areas.

Table 1: National Context Factors Affecting State Protection of Beaches, Dunes, Bluffs, and Rocky Shores

State	Open Ocean Coastline miles (1)	Total Shoreline Miles (2)	National Shoreline Miles and % Critically Eroding (3)	% State Land Area in Coastal Zone (4)	Coast Pop. density 1990 (4)	% Coast Chg 1970-90 (5)	Presence of Natural Coastal Resources and Beach and Rocky Shore as Percent of State's Open Ocean Coastline	Beaches, Dunes, Bluffs, and Rocky Shores	Major Barrier Islands Number/Miles (7)	CRBA Units length in Miles (8)	USACE Major Shoreline Projects 1950-93 (9)	FEMA Upton-Jones Claims (10)	Resource Protection-Importance of Issue: H M L (1)
	Miles	Miles	Miles	% CE	Area	Pop.	%	Beaches	Dunes	Bluffs	Rocky Shores		
AL	46*	607	352	9	6	12	171	27%	y-100%	n	n	-	H
AK	6640	33904	47300	>1	67	85	1	89%	y-nd	y	y	-	H
AS	126	126	nd	nd	100	100	607	72%	y-nd	y	y-nd	-	H
CA	840	3427	1827	4	24	73	605	39%	y-nd	y	y-nd	1	H
CT	0	618	270	9	47	62	887	8%	y-31%	y-rare	y-14%	-	M
DE	25*	381	226	12	100	100	338	22%	y-100%	y	n	3	H
FL	1266*	8426	6266	5	100	100	228	90%	y-65%	y	n	10	H
GU	108*	110	nd	3	100	100	637	57%	y-37%	n	y	-	H
HI	750	1052	nd	2	100	100	174	44%	y-25%	y-nd	y-nd	-	H
LA	149*	7721	1943	2	37	49	171	16%	y-50%	y	n	3	L
ME	228	3478	2500	>1	39	72	72	29%	y-10%	y	y-90%	-	H
MD	32*	3190	1939	9	66	70	507	12%	y-100%	y	n	2	H
MA	192	1519	1200	11	45	75	1272	5%	y-77	y	y-nd	32	H
MI	0	3224	nd	nd	55	50	154	-5%	y-nd	y	y-nd	32	H
MS	44*	359	247	15	4	12	192	30%	y-41%	n	n	1	H
NH	16*	131	40	5	12	32	331	67%	y-70%	y	y-30%	-	H
NJ	125*	1792	469	26	76	90	1219	6%	y-100%	y	n	-	H
NY	125*	1850	638	47	37	84	858	-3%	y-100%*	y	y	10	H
NC	320*	2625	3661	15	19	11	75	-3%	y-100%	y	n	262	H
NM	184*	206	nd	nd	100	100	236	255%	y-nd	n	y-nd	-	H
OR	362*	1410	500	13	20	38	82	46%	y-72%	y	y-28%	-	H
PA	0	140	nd	nd	4	25	1701	-9%	y-19%	n	y-81%	23	H
PR	311	700	nd	nd	12	100	856	30%	y-50%	y	y-nd	-	H
RI	40	384	340	7	100	100	950	6%	y-68%	y	y	3	H
SC	181*	2876	3063	2	26	24	114	57%	y-100%	y	n	9	H
VI	nd	175	nd	nd	100	100	771	63%	y-nd	y	y-nd	-	H
VA	200*	3315	983	26	22	62	423	40%	y-100%	y	y-nd	8	H
WA	171	3026	2337	>1	31	70	172	46%	y-35%	y	y-65%	12	H
WI	0	820	nd	nd	19	39	177	0%	y-10%	y	y-8%	-	M
Total	nd	85770	31513***	nd	-	44	-	-	y-29	y21 n8	y18 n11	y17 n12	26H 2M 1L

KEY and SOURCES:

\* denotes where state coastline miles data differs from General Coastline miles data in US DOC, NOAA 1975. The Coastline of the United States  
 \*\* New York- Atlantic Ocean only covered under this study. \*\*\* Does not include the Great Lakes States or the Island Territories and Commonwealths.

(1) Individual State CZM Profiles.

(2) US DOC, NOAA. 1975. *The Coastline of the United States*.

(3) USACE. 1970. *National Shoreline Study*.

(4) Coastal Ocean Policy Roundtable. The 1992 Coastal Status report: A Pilot Study of the US Coastal Zone and its Resources, Tables 2 and 3.

(5) US DOC, NOAA, NOS. 50 Years of Population Change Along Our Nation's Coasts 1960-2010.

(6) Individual State CZM Profiles on Protection of Beaches, Dunes, Bluffs and Rocky Shores

(7) Ringold, Paul and John Clark. 1980. *The Coastal Almanac*, Table 8.

(8) US DOI, US FWS. Adapted from CBRA Table December 22, 1992.

(9) USACE. *Shoreline Protection and Beach Erosion Control Study: Phase 1*.

(10) FEMA, Mark Crowell, Upton-Jones Database.

Table 2. SUMMARY OF STATE CZM PROGRAMS.....  
 YEAR CZM PLANS APPROVED, MANAGEMENT TECHNIQUES USED UNDER CZMA, AND PRIMARY AUTHORITIES AND TOOLS EMPLOYED TO CONTROL LAND AND WATER USES AND PROTECT NATURAL RESOURCES (BEACHES AND DUNES, BLUFFS AND ROCKY SHORES)

State	Year Approved	Program Changes affecting Natural Resources	Technique for control of land and water uses (A, B, C)	Primary Authorities and Tools Employed under state CZMP that affects protection of beaches, dunes, bluffs, rocky shores
AL	1979	1994	A, B	Combination of a direct state CCCL regulatory program and voluntary local planning/zoning consistent with ACMP.
AK	1979	1981 1983-1993	A, B	Combination of state coastal policies and mandatory District Control Zone plan/regulatory implementation. Also 99% in public ownership with direct state and federal management of coastline property.
AS	1980	1994	B	Direct Territory regulatory program with Land Use Permits and Project Notification and Review System in coastal zone.
CA	1978	1983-92, 1993	A, B	Combination of a direct state regulatory program with Coastal Development Permits and voluntary local planning/regulation/ and permit delegation program.
CT	1980	1987-88, 1992	A, B	Combination of direct state regulation of shoreline stabilizations and state policy/use guidelines and mandatory Municipal Site Plan Review and voluntary local planning.
DE	1979	1984	A, B	Direct state regulatory program with coastal permits along oceanfront.
FL	1981	1985, 1986 1994	A, B	Network of state regulatory programs. State CCCL permit program. However, beginning in 1994, mandatory local planning and regulations based on state standards and approval added to program.
GU	1979	1993	B	Network of direct Territorial planning and zoning regulatory program through Seashore Protection Permits and Territory Land Use Commission Permits.
HI	1978	1979-80, 1986-87 1989, 1994-5	A, B	Combination of a network of direct state land use and regulatory programs and mandatory County Special Management Area and Shoreline Setback Variance regulation programs.
LA	1980	1990, 1991 1993	A, B	Combination of a direct state regulatory program with Coastal Use Permits in coastal zone and a local planning and regulation program.
ME	1978	1989, 1993 1995	A, B	Combination of a network of direct state regulatory programs with Sand Dune and Shoreline Permits and mandatory Municipal Shoreland Zoning Regulations and beginning in 1988 mandatory local comprehensive plans.
MD	1978	No	A, B	Combination of a direct state regulatory program with Beach Erosion Control Districts and sand dune permits and County zoning to implement state setbacks.
MA	1978	1990, 1996	A, B	Combination of a direct state regulatory program with state permit in tidal and coastline area and a voluntary local planning and Local Conservation District regulation program.
MI	1978	1974, 1989 1990, 1994	A, B, C	Combination of a network of direct state regulatory programs with sand dune permits, bluff permits and earth change permits along the coast, State model zoning plan, and option local planning/zoning.
MS	1980	1994	B	Direct state regulatory program, but only for shoreline stabilizations. All beaches are artificial and no state regulation above MHW since all artificial beaches are public and construction prohibited.
NH	1982/88	1991, 1995	B	Combination of a network of direct state regulatory programs along coast for Tidal Buffer Zone and Shoreland Development Permits, and optional local planning/zoning, and local planning. Mandatory local shorelands ordinances and setbacks based on state standards beginning in 1995, but not part of approved control techniques.

Table 2: SUMMARY OF STATE CZM PROGRAMS AMENDED. MANAGEMENT TECHNIQUES USED UNDER CZMA, AND PRIMARY AUTHORITIES AND TOOLS EMPLOYED TO CONTROL LAND YEAR CZM PLANS APPROVED. YEAR PLANS AMENDED. MANAGEMENT TECHNIQUES USED UNDER CZMA, AND PRIMARY AUTHORITIES AND TOOLS EMPLOYED TO CONTROL LAND AND WATER USES AND PROTECT NATURAL RESOURCES (BEACHES AND DUNES, BLUFFS AND ROCKY SHORES)

State	Year Approved	Program Changes affecting Natural Resources	Technique for control of land and water uses (A, B, C)	Primary Authority Employed under state CZMP - affecting protection of beaches, dunes, bluffs, rocky shores
NJ	1978/80	1981-83, 1982-94	B	Combination of network of direct state regulatory programs for activities in the coastal zone, erosion hazard areas, and barrier islands. Voluntary local land use plans, but not part of approve control technique.
NY	1982	1988	A, B	Combination of a direct state regulatory program with Coastal Erosion Hazard Area Permits and voluntary local Erosion management planning/ regulation.
NC	1978	1979, 1981, 1985	A, B	Combination of a direct state regulatory program with permits in Areas of Environmental Concern (AECs) along the coast and mandatory local planning and minor development permits in AECs.
NM	1980	1983, 1991	B	Direct Commonwealth regulatory program with coastal permits in Shoreline APCs.
OR	1977	1980-86, 1984	A, B	Combination of state policy plan and guidelines, network of direct state regulatory programs with Ocean Improvement Permit (OIP), and Removal-Fill Permit, and mandatory Local Comprehensive Plans, land use controls and regulations local planning and regulation program.
PA	1980	1984	A, B	Combination of a direct state regulatory program for shoreline stabilization structures and mandatory local Bluff Setback ordinances. Also, only major beach area in State ownership, so no state regulations for beaches and dunes.
PR	1978	1983, 1988, 1992	B	Direct Commonwealth regulatory programs with permits along shoreline, Flood Area Permits, and Maritime Control Zone Authorization/Concessions.
RI	1978	1979, 1986, 1988, 1990-93	B	Direct state regulatory program with CRMC permit (Assent) along coastal and barrier islands.
SC	1979	1988, 1990	B	Direct state regulatory program with SCCC Permit along coast. Beginning in 1990, local beachfront management plans required, but only for beach access and beach nourishment decisions and not a control technique change.
VI	1979	1987, 1992, 1994	B	Direct Territory regulatory program with Coastal Zone Permit along coast and network of regulatory programs inland.
VA	1986	1983	A, B	Combination of a direct state regulatory program with permits on Coastal Primary Sand Dunes and Beaches and designated counties/cities may adopt local dune ordinances and issue permits.
WA	1976	1982	A, B	Combination of a state policy plan, direct state regulatory program for shoreline stabilizations and delegated mandatory Shoreline Master Program (SMPs) and coastal permitting.
WI	1978	NO	A, B	Combination of a direct state regulatory program for shoreline stabilizations and mandatory local shoreland zoning ordinances with setbacks and delegated permitting.
Total	1976-1988	Changes 27 yes 2 no	18 A, B 10 B 1 A, B, C	17 Combination of direct state and local planning/regulatory programs based on state standards, guidelines, model ordinances: AL, AK, CA, CT, HI, LA, ME, MD, MA, MI, NY, NC, OR, PA, VA, WA, WI. 12 Direct state regulatory program(s): AS, DE, FL, GU, MS, NH, NJ, NM, PR, RI, SC, VI. 3 States where ownership and management of beach/dune resources a primary tool: AK, MS, PA

KEY:

Techniques means the techniques used by a CMP for control of coastal uses. Under CZMA Section 306(d)(1), 15 CRF, Section 923.42-44  
 Technique A- State establishment of criteria and standards for local implementation  
 Technique B- Direct State land and water use planning and regulation  
 Technique C- State review on a case-by-case basis of actions affecting land and water uses subject to the management Program  
 Sources: CZM Profiles, OCRM Review of Approval Findings and Amendments, FEIS Documents

Table 3. Summary of State CZM Tools Employed to Protect Beaches and Dunes

TOOLS	A	A	A	C	C	D	F	G	H	L	M	M	M	M	N	N	N	N	N	O	P	P	R	S	V	V	W	W	Total
	L	K	S	A	T	E	L	U	I	A	E	D	A	I	S	H	J	Y	C	M	R	A	R	I	C	I	A	I	Yes
REGULATORY & PLANNING TOOLS																													
Restict. Construction	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	28
Restridt Shoreline Stabilizations	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	28
Restridt Pedestrian or Vehicular Access	y	y	n	y	y	y	y	y	y	n	y	y	y	y	n	y	y	y	y	n	y	n	y	y	n	y	y	y	22
Protect Habitat, Other Restrictions	n	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	n	y	n	y	y	y	y	y	y	y	25
Permit Compliance Program	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	n	y	y	y	y	y	y	27
Local Plan and/or Regulate	y	y	n	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	n	y	n	n	y	n	y	n	y	y	22
Special Area Management Plans	n	y	n	y	n	n	y	y	n	y	n	y	n	n	n	n	n	n	n	n	n	n	y	n	y	n	y	n	12
Other Adopted Plans	n	n	y	y	n	n	y	n	n	y	n	y	y	n	y	n	y	y	n	y	y	n	n	y	n	y	n	y	15
DIRECT LAND MGT, RESTORATION AND ACQUISITION TOOLS																													
29																													
Shoreline in State Parks Management	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	29
Natural Areas Protected	y	y	n	y	y	y	y	y	y	n	y	y	y	n	y	y	y	y	y	y	n	y	y	y	y	y	y	y	25
Dunes Revegetated	y	n	n	y	y	y	y	n	n	y	y	y	n	n	n	y	n	n	n	n	n	n	n	n	n	n	n	n	13
Beaches Nourished or Renourished	n	n	n	y	y	y	n	n	y	y	y	y	n	y	y	y	y	y	n	y	y	n	n	y	n	n	n	n	17
Shoreline Armoring & Repairs	n	n	n	y	y	n	y	n	y	n	y	y	n	n	y	y	n	n	n	n	n	n	n	n	n	n	n	n	11
Coastal Lands Acquired	n	n	n	y	y	y	y	y	n	y	y	y	y	n	y	n	y	n	n	y	y	n	n	y	n	n	n	n	21
NONREGULATORY TOOLS																													
29																													
Public Investment Restrictions	n	n	n	y	y	y	y	n	n	y	y	y	y	n	n	n	y	y	n	n	n	y	y	n	n	n	n	n	13
Public Investment Incentives	n	n	n	n	n	y	y	n	n	y	n	y	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	4
Coastal Property Disclosure	n	n	n	n	n	n	y	n	n	y	n	n	n	y	n	n	n	n	n	n	n	n	n	n	n	n	n	n	6
Education/Outreach/Technical Assistance	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	n	y	y	y	y	y	28
Financial Assistance	y	y	y	n	y	n	y	y	y	y	n	y	y	y	y	y	y	y	n	y	y	n	n	y	n	y	n	y	20
RESEARCH TOOLS																													
29																													
Methodologies for Shore	y	n	n	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	n	y	n	y	n	y	n	n	n	y	19
Beech Profiles	y	n	n	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	n	y	y	y	n	y	n	y	y	23
Natural Areas Inventory	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	y	27
Technical Reports	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	y	y	y	y	29
Aerial Photos	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	29
Sea Level Rise Considerations	n	n	y	y	y	y	n	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	25
Total Tools Employed - 25																													

**KEY:**

Y - Yes, Management Tool employed by state

N - No, Management Tool not employed by state

Total Tools Employed out of 25: AL-15, AK-13, AS-12, CA-22, CT-21, DE-19, FL-24, GM-17, HI-19, LA-16, ME-21, MD-23, MA-20, MI-19, MS-16, NH-20, NJ-18, NY-20, NC-21, NM-12, OR-20, PA-11, PR-15, RI-16, SC-23, VI-13, VA-20, WA-15, WI-17.

Source: Individual CZM Profiles

Version 1/1/97

Table 4: Summary of State CZM Tools Employed to Protect Bluffs and Rocky Shores

STATES	AK	AS	CA	CT	GU	HI	ME	MA	MI	NH	NM	OR	PA	PR	RI	VI	WA	WI	Total YES
RESOURCE PRESENT																			
Bluffs/ Rocky Shores	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	n Y	Y Y	Y Y	Y n	Y Y	Y Y	Y Y	Y Y	Y Y	17 17
REGULATORY TOOLS																			
Revised Construction																			
Bluffs/ Rocky Shores	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y n	- Y	Y Y	Y Y	Y -	Y Y	Y Y	Y Y	Y ?	Y Y	17 15
Other Regulatory Controls																			
Bluffs/ Rocky Shores	n n	Y Y	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y n	- Y	? ?	Y Y	Y -	n n	Y Y	Y Y	Y ?	Y Y	13 11
PLANNING TOOLS																			
Local, state, or special area	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	? ?	n n	- Y	n n	Y Y	Y -	Y Y	Y Y	Y Y	Y Y	n n	13 13
DIRECT LAND MGT																			
State Owns and Manages																			
Bluffs/ Rocky Shores	Y Y	n n	Y Y	Y ?	Y Y	Y Y	Y Y	? Y	Y ?	- Y	? ?	Y Y	Y -	Y Y	Y Y	? Y	Y Y	Y Y	13 13
Natural Areas Protection																			
Bluffs/ Rocky Shores	Y Y	n n	Y Y	Y ?	Y n	Y Y	Y Y	? Y	Y ?	- Y	? ?	Y Y	n -	Y Y	Y Y	? Y	Y Y	Y Y	11 12
ACQUISITION TOOL																			
Lands Acquired																			
Bluffs/Rocky Shores	n n	n n	Y Y	? ?	n n	Y Y	Y Y	? ?	Y ?	- Y	n n	n Y	Y -	n n	? ?	n n	Y Y	Y Y	7 7
NONREGULATORY TOOLS																			
Public Investment Restriction	n n	n n	Y n	Y n	n n	n n	n n	? ?	Y ?	- n	n n	n n	n -	Y Y	n n	Y Y	n n	n n	5 2
Coastal Property Disclosure	n n	n n	n n	n n	n n	n n	n n	n n	n n	- n	n n	Y Y	n -	n n	n n	n n	n n	n n	1 1
Education/Outreach/TA	Y n	Y Y	n n	Y Y	n n	Y Y	n n	Y Y	Y ?	- Y	n n	Y Y	Y -	n n	Y Y	Y Y	Y n	Y Y	12 9
Financial Assistance	Y Y	Y Y	n n	Y Y	n n	Y Y	n n	Y ?	- Y	- Y	n n	n Y	Y -	n n	n n	n n	Y Y	n n	7 7
RESEARCH TOOLS																			
Inventories/ Designate protection area	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y Y	Y Y	Y ?	- Y	n n	Y Y	Y -	? Y	n Y	Y Y	Y n	Y Y	13 13
Technical Reports	Y Y	Y Y	Y Y	Y Y	n n	Y Y	Y Y	Y Y	Y ?	- Y	n n	Y Y	Y -	Y Y	Y Y	? ?	Y n	Y Y	14 12
Total Tools Employed--13	9 8	8 8	9 8	11 8	6 5	11 11	9 9	6 8	11 ?	- 11	2 2	10 12	10 -	7 8	8 8	7 8	11 6	9 9	

Key:

Y- YES, Management Tool employed by state

n- NO, Management Tool not employed by state

- not applicable

? unknown, not state data or insufficient data to determine answer

Resource Presence Summary:

17 States with Bluffs: AK, AS, CA, CT, GU, HI, ME, MA, MI, PA, NM, OR, PR, RI, VI, WA, WI

17 States with Rocky Shores: AK, AS, CA, CT, GU, HI, ME, MA, MI, NH, NM, OR, PR, RI, VI, WA, WI

13 States with No Coastal Bluffs: AL, DE, FL, LA, MD, MA, MS, NH, NJ, NY ocean coast only, NC, SC, VA

12 States with No Coastal Rocky Shores: AL, DE, FL, LA, MD, MS, NJ, NY ocean coast only, NC, PA, SC, VA



Table 5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	Key provisions: setbacks, distance inland regulated/location, activities regulated, exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.		
State	SB	CZ	SS	PA	VA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected	CZ-Control Zone LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	SS-Shoreline Stabilization Structures	OUTCOME DATA & SUFFICIENCY Database, Permit Outcome Data and Plan Outcome Data (S) Sufficient Data Case Example
AL	Y	Y	Y	Y	Y	n*	Beachfront SB-Seaward of 40 ft. crestline (120-450 feet landward of MHWL) Exceptions- SF 1200 sq. ft. or less if bought before CCL and no room to build; repairs if <50% damaged. CZ- state ADEM CCCL regulates construction 40 ft. inland from crestline to the 10-ft elevation line. Repairs allowed if <50% damaged. Both a setback and control zone. SS-No SS allowed on gulf-front. Exceptions-case-by case if structure built prior to regulation and threatened by erosion. PA-regulates boardwalks but no permit for dune cross-overs. VA-only cleanup or law enforcement vehicles allowed on beach H-3 miles sea turtle nesting; 40 acres beach mouse; 25 acres tern nesting habitat protected. LDLP- Voluntary local planning and zoning ordinances consistent with state CCCL provisions. State retains CCCL permitting			DATABASE Computerized permit tracking: YES Permit Outcome Data: HS/SS no data HS-no permit data SS-no permit data Local Permits- no data LP- 1 approved plan, 3 locals with zoning ordinances. No linear/area data
AK	n	Y	n	Y	Y	Y	Shoreline CZ-Regulates construction through district control zone. Regulates new activities in hazardous and erosion hazard areas through District land use, zoning and subdivision regulations based on statewide Guidelines and Council Approval. Covers flood, storm surge, littoral process areas. Distance inland/area covered unknown. No restrictions on repairs. State policies to minimize property damage and loss of life and to manage rocky islands and seacliffs to avoid harassment of wildlife, destruction of important habitat and the introduction of competing/destructive species/predators. Q- what is landward boundary of AK CZ regulatory program? SS-No regulation of SS- relies on USACE PA- trails regulated VA- transportation route inland from beach/shoreline unless WVD or no alternative. H-49,000 acres of Bald Eagle habitat. (also see 990,335 acres in marine parks-under Direct Land Management) O- nearshore sand and mining regulated. LDLP- Mandatory District land use planning, controls zones and regulations based on statewide guidelines and Council Approval. Need more data. SAMP- Areas Designated which merit special attention. No data. Need more information on state policies/District Guidelines.			DATABASE Computerized permit tracking: YES Permit Outcome Data: HS- data too limited SS-na LP- 33 approved. No data on area covered or outcomes. SAMPs- No data on areas designated. No linear or area data
AS	Y	Y-3	Y	n	n	n	Shoreline SB-from OHWL 25ft for residential and 50 ft for commercial. No exceptions. CZ- (1)Territory regulates activities through Territory-wide zoning and land use permit within 200 ft MH-WL. Permit denied if subject to shoreline erosion, diminish physical/visual access, degrade CR. Exceptions-public purpose rec., WVD, no better alternative site, and SF w/in existing residential areas. (2) Also building permits for coastal hazard areas and (3) permits for grading, excavation, fill, steep slopes. Variances- for use changes such as commercial or industrial. Conservation Zone on all but Pago Pago Harbor & Industrial Park. SS- Regulated, allowed to protect property from erosion, uses USACE standards. H- case-by-case review of permits to protect habitat. Steep Slope/Land Slide Areas Soil Erosion/Slope Erosion Policy to control road building and construction to minimize soil erosion and avoid clearing, grading, construction on slopes >40%. Use Landslide Mitigation Maps to identify steep slope hazard areas to avoid. Engineering Plans required in high/medium slope areas. Most land in agriculture or open space. OP- Territory-wide zoning serves as a land use plan.			DATABASE Computerize permit tracking: YES for Land Use Permits since 1984 Permit Outcome Data: HS: island-wide, no linear data or by geographic/resource area SS- 20 in 11 yrs, no linear data No data on Territory-wide zones and variances for use changes.

## Rocky Shorelines

OUTCOME DATA & SUFFICIENCY
Database, Permit Outcome Data and Planning Outcome Data
(S) Sufficient Data
Case Example
DATABASE
Computerized permit tracking; NO, developing electronic logging system.
Permit Outcome Data: HS/SS. No, coast-wide only, no break-down by type or resource or sub-area.
HS-coastwide
SS- no data
Case Examples
LP- 126 LCP segments, 105 (83%) certified LUPs, 88 (70%) certified Implementation Plans. Cover 86% of CZ. All locals with beaches/bluffs have plans/regulations for these areas. No statewide data on outcomes.
Case Examples
SAMFPS-a) and b) No statewide data on area designated. No linear/area data. c) *700 parcels (S)
OP- no statewide data on outcomes.

Table 5. Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION		SUMMARY OF TOOLS EMPLOYED		OUTCOME DATA & SUFFICIENCY	
State		Key provisions: setbacks; distance inland (regulated/location); activities regulated; exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.		OUTCOME DATA & SUFFICIENCY Database, Permit Outcome Data and Planning Outcome Data	
SB	CZ	SS	PA	LD	(S) Sufficient Data Case Example
			VA	LP	
			H	S	
			O	OP	
CT		CZ-Control Zone		SS-Shoreline Stabilization Structures	
n	y	y	y	y	Database
			n	n	Computerized permit tracking:
			y	n	NO for HS, YES for SS
			y	n	MS- No statewide data base for local MS-PR.
			y	n	SS- state database since 1988, by activities on or adjacent to specific resource areas. But no linear data.
					Permit Outcome Data:
					HS- 3,229 MS-PR permits issued for activities with 1000 feet over 5 1/2 years (1/86-6/91). Permits not broken-down by resource area.
					SS- 93 State DEP permits approved in 9 years (1986-1996) in or adjacent to B/D, BL, RS areas. No linear data
					LP- 35 of 41 Towns/Boroughs have approved plans. No statewide data.
					Most approved plans have established setbacks from sensitive coastal resources/HTL.
					Case Examples
DE		General Use Guidelines for:		DATABASE	
		Beachfront/Bluffs/Rocky Shores- preserve natural beach systems/bluff vegetation/rocky shore slope/composition and natural features; setback; protect habitat; siting to preserve littoral system; prohibit excavation of beach; construction to minimize adverse impacts, public access; siting to avoid visual/aesthetic impacts.		Computerized permit tracking: YES	
FT	y	y	y	n	Permit Outcome Data:
			y	n	18 years (1973-1995)
			y	n	HS- 1550 Letters of approval (landward of setback)
			y	n	HS- 108 permits (seaward of setback)
					No linear data
					SS- 59 (2 years- 1993-1995). No linear data.
					Some Setback Replacement, Relocation data.
					LD/LP- soil Conservation Districts implement Erosion and Sediment control Act, but not along ocean. State has comprehensive plan and counties have growth management plans, but not part of CZMP.

Table 5. Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	Key provisions: setbacks; distance inland regulated/location; activities regulated; exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities; voluntary or mandatory local plans required; other enforceable plans.	
State	SB	CZ	SS	PA	VA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected O-Other	CZ-Control Zone LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	SS-Shoreline Stabilization Structures LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan
FL	Y	Y	Y	Y	Y	Y	Beachfront SB-30-year erosion zone setback for major structures. Zone determined on permit-by-permit basis from SHWL w/in 30 year after permit. Exception-SF on parcels platted prior to 1985. Can repair/rebuild but not seaward of zone. CZ- permits for activities with CCCL. Measured from SHW to landward extent of 100-year floodplain. Line ranges from a few feet to several hundred feet. SS- state allows new and repair of SS by permit. Anti-armoring policy for areas with no armoring repeated in 1992. PA- Boardwalks, dunes crossovers regulated by permit. VA-5 counties allow driving on beach to facilitate beach parking needs. H- sea turtle nesting areas. LD- State could delegate CCCL and 30-Year erosion zone permits to local governments--None delegated at this time. LP- In 1994, mandatory local comprehensive plans and implementing regulations added to CZMP. Must meet state requirements including beach/dune management. Prior to that relied on network program at state level. op- a) Florida Beach Erosion Control Assistance Program identifies/plans erosion control and funds beach management projects. b) Inlet Management Plans- state funds inlet management plans for sand transfer to address adverse effects of channel dredging on littoral drift and beaches.		
GU	Y-2 FT	Y-2	Y	Y	Y	Y	Shoreline SB- (1) Ocean Shore Public Access Zone right between MLW and 25 feet inland from 2 foot contour line of Geo. Survey. (2) Zoning Setback of 35 feet from MHW bounding beach. No higher than 20 feet within 75 feet of MHW. Exception-Beach does not include shoreline if cliff/bluff higher than 25 feet nor village lots >100 sq. meters in residential areas before WWII. Cannot restore nonconforming buildings if destroyed >50% value of building unless conform to regulations for new buildings. VA/boardwalks- recreation, aesthetic, commercial value and not interfere surrounding property and public access to beach. CZ- Territory-Wide Land-Use Plan, Zoned Districts. Policies and Guidelines. Requires state agencies act consistent. (1) Territory permits required for activities in Seashore Reserve seaward to 10 fathom contour, all islands, and inland from MHW to 10 meters or inland edge of public right of way. Exception- repair/improve SF at \$7500 or less and maintenance dredging. (2) Flood hazard area building permit for new and expanded activities. No permit required for repairs. SS- TSPA and submerged lands permit would be required. Relies on USACE permit programs. PA-boardwalks regulated through TSPA. VA- vehicles restricted on public beaches. H- conservation/preserve areas. All protected habitat areas under public ownership, so covered under Direct Land management O-sea and marsh prohibited on beaches and taking of coral and live rock prohibited. LD- Local building official issues building permit unless outside organized villages, then issued by Territorial Land Use Commission. SAMP- a) Guam Seashore Reserve Plan and b) Flood Hazard Areas as APCs- see under CZ above. c) Recreation and Water Use Management Plans- plan for 6 mile stretch designates jet skis area, bird nesting protection areas, Manatee fish run protection areas. d) Erosion Control Plans to get clearing/grading permit. Development limited in areas 15% or greater slope by erosion/sediment requirements. Development on bluffs and slopes >15% discouraged, not restricted. No regulations/plans for rocky shores. Public owns below MHW (Submerged lands are 2/3 territory and 1/3 federal). About 1/3 coastline is federal and contains rocky shores and cliffline areas.		
							DATABASE Computerized permit tracking: NO Permit Outcome Data: HS: island-wide 357 requests, 86% approved. No data by resource area, no linear data. SS: none permitted since 1970s. (S) H- 3,000 acres-public. Use Districts- 100% of Guam CZ covered. 21% of land area in Habitat Protection Areas. No data on % conservation districts, type habitat protected. SAMP- a) covers seashore inland 10 meters -inl. under regulatory tools. b) no data c) 6 linear miles. 3 jet skis use zones/ planning areas area/distance defined for each. 2 Adopted 1990-91. 1 pending. (S)		DATABASE Computerized permit tracking: YES Permit Outcome Data: HS/SS: NO data provided by state Boardwalks- Thousands LP- 170 cities/35 counties with approved plans. Beach Management Plans cover 58.8 miles (10.8% of beachfront). No statewide data on outcomes. Other- a) all ~500 miles of beach under state erosion plan- ~100 miles of beaches restored/dunes restored. See under Direct Land Management. (S) b) 29 inlet mgmt plans. No data on results

Table 5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	LD	OP	exceptions, shoreline stabilization regulations, regulation of access, habitats regulated, other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.	Database, Permit Outcome Data and Planning Outcome Data
				PA	LD		SB- Setback PA-Pedestrian Access VA- Vehicular Access H-Habitat Areas Protected CZ-Control Zone LD- Local Permit Delegation LP- Local Planning S- Special Area Management Plan (SAMP) OP- Other Plan	(S) Sufficient Data Case Example
HI	Y	Y-3	Y	Y	Y	Y	Shoreline SB- Shoreline setback of 40 feet along most shorelines. Counties establish setback based on state guidelines and may establish greater setback distance. Prohibits new structures seaward of setback. Shoreline defined as the upper reaches of the wash of the waves, other than storm and seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves. Variances-20-ft for small lots, shoreline stabilization if in public interest or hardship, protection of existing structures at risk from shoreline erosion, new or repair/minor expansion of boating, Maritime, or water-sport recreation facilities, public agency/utilities, private facilities clearly in public interest, private facilities/improvements if not adversely affect beach processes, nor artificially fix shoreline if hardship demonstrated, private facilities/improvements that artificially fix shoreline if shoreline erosion likely to cause hardship but only if in public interest; moving of sand from one location to another if not adversely affect beach processes, size of beach, erosion, cultivation of crops, aquaculture, landscaping, drainage. CZ- a) Special Management Areas (SMAs) must extend 100 yards inland from shoreline, so extend several miles inland to cover resources or set boundary at inland coastal road. Permits required for development (land uses w/market value >\$25,000 or significant adverse effect on environment/ecology. Exemptions: Single-family residences; land use <\$25,000; subdivisions prior to 12/1/75. Major permits >\$125,000 or adverse environmental or ecological impact, otherwise minor permits. b) Land Use Commission Land Use Boundary Amendments to reclassify land use from agriculture or conservation, rural to urban; c) Dept. of Land and Natural Resources Conservation District use Permits. SS- Allowed but require a Shoreline Setback variance. No public hearing requirement for stabilization of shoreline erosion by the moving of sand entirely on public lands. Variance requires demonstration of public interest or hardship. PA- HCZMP policies to provide pedestrian access but restricted in areas where natural resources may be adversely affected on case-by-case basis. No boardwalks. VA- Vehicular access restricted. Most roads have barriers limiting access to shoreline, except for government vehicles. H- Endangered plant/animal species on case-by-case review. Natural Area Reserves, Wildlife Sanctuaries on state lands. O- Prohibit taking/mining sand, dead coral, coral rubble, rocks, soil or beach w/in shoreline setback area or within 100-ft seaward from shoreline. LD- Counties administer both Shoreline Setback Variances and Special management Area (SMA) Permits- see above. LP-County Master Plans, zoning and subdivision regulations required. Zoning based on state-mandated setbacks/guidelines. S- Natural Resource Areas, Wildlife Sanctuaries, and Marine Life Conservation Districts.	Database Computerized permit tracking: YES, updated in 1994 Permit Outcome Data: 1993-1995-Permits issued 4 Counties Total SMA Major Permits: 153 SMA Minor Permits: 730 Shoreline Setback Variances: 27 DLNR-CDUA Permits: 53 LUC District Boundary Amendments: 23 Total CZMP regulatory Permits: 1342 No data on resource areas affected, type of activity regulated SAMP- data received late, not yet incorporated.
LA	n	Y	Y	n	Y	Y	Beachfront CZ- Coastal Use Permit required in CZ. Inland boundary based on intracoastal waterway, highways, natural ridges and parish boundaries. SF Exemption: Single-family and No restriction on repair/rebuilding. Uses of state concern include dredging, use of submerged lands, mineral, oil and gas, and energy activities, uses of local concern that may affect the region/state/nation. Uses of local concern include: shoreline modifications such as jetty/breakwaters/bulkheads, piers; dredging/fill not intersecting more than one waterbody; maintenance dredging; private water control projects >\$15,000. SS- Coastal Use Permit required. Exemption- No restriction on repair/rebuilding damaged shoreline structures and no permit needed if rebuild same structure and no dredge/fill required. H- Bird nesting sites protected. O- Sand scraping, dune reshaping require Coastal Use Permit. LDALP- Local coastal use permits allowed, but not required, for Uses of Local Concern. 8 parishes with local plans/regulation based on state guidelines/certification. Few land use/ restrictive zoning ordinances. OP-a) Water and Marsh Management Plan includes erosion prevention. b) Beneficial Use of Dredged Materials Policy- If USCOE dredges > 500,000 cu yd, must work with state to determine beneficial use. Note: Beach Management Plan with guidelines for beach renourishment, but not incorporated into CZMP.	DATABASE Computerized permit tracking: NO Permit Outcome Data: HS/SS: No data H: Bird nesting sites on Chandeleur Island. No linear data LP- 8 parishes have certified plans. No data on linear/area resources protected. OP-a) no data b) no data

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TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	Key provisions, setbacks, distance inland regulated/location, activities regulated, exceptions, shoreline stabilization regulations, regulation of access, habitats regulated, other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.		
State	SB	CZ	SS	PA	VA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected	CZ-Control Zone LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	SS-Shoreline Stabilization Structures LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	OUTCOME DATA & SUFFICIENCY Database, Permit Outcome Data and Planning Outcome Data (S) Sufficient Data Case Example
ME	Y-2 R FT	Y-3	Y	Y	Y	Y	Beachfront/Dunes and Shoreline SB- (1) In Frontal dunes (V-Zone) no new structures, shore stabilizations, de facto setback. Dune encroachment is setback behind 100-year floodplain (v-zone) and sea level rise area. No setbacks in back dunes. Prohibits reconstruction of structures damaged >50%, unless all new building standards met i.e., minimal damage to dunes, lot restrictions, bird habitat protection, revegetation of disturbed areas. After 1/89 may not expand floor area/volume by >30% of existing structures. (2) Under MSLZ, setback from residential district is 75 feet; general development/commercial- 25 feet. Existing development follows existing pattern. In Resource Protection Areas setback is 250 feet from NHWL. CZ- (1) State NRPA/BEP permit for any activity on coastal sand dunes. Regulates activities on coastal frontal and back dunes. Dunes mapped by states. Frontal dunes extend inland 125-175 feet from MHW or seaward edge of sand dune. Setbacks (see above). In Back Dunes, size limits max. 2,500 sq. ft. and must be moveable structure or elevated 3' above sea level rise. MF elevations higher. Exceptions- maintenance/repair/additions to existing structures, temporary structures, walkways, open decks >200 sq. ft; underground storage tanks outside v-zone. (2) NRPA permit also for activities in "protected natural resource areas" which include 100-year flood zone, moderate/high value wetlands, steep slopes >20%. Setback 250 feet (see above). Exception- Single-Family under certain conditions. (3) Under LURL same restrictions as MSZA, but for unorganized areas. SS- prohibits new rip-rap, seawalls, groins, other SS in/on any sand dune system. Existing-existing seawalls may be repaired/maintained unless building behind SS damaged >50%. Effective 1995, existing seawalls can be fortified, built bigger and deeper if undetermined. Property owner w/o permit may place protective materials (rip-rap, sand bags, etc.) or strengthen SS. PA- State standards- private 4 ft. wide, public 10 ft. wide allowed w/o permit if sand transport and dunes not affected. Maintenance/repair of existing accessways to residential d/n require permit, if conditions met. However, Notice to state required. VA- no new roads, driveways, parking in V-zone. No other specific restrictions on beach/dune. H- shore bird nesting areas, essential wildlife habitat areas protected. O- sand fencing, beach nourishment, sand scraping and removal regulations. LD- Municipal shoreline zoning regulations (MSZA) required for activities within 250 feet of NHW line. Six districts LP- State Comprehensive Planning and Land Use Regulation Act (CPLURA) of 1988 established 10 coastal area goals and mandates planning to address growth. More comprehensive than Municipal Shorelands Zoning Act since covers watersheds and addresses growth/infrastructure issues. Incorporates 250 ft. setback from resource protection areas in MSZA. Local must adopt ordinances which meet or exceed state standards in MSZA. Land Use Regulation Law (LURL) requires planning in unorganized areas (5%) of Maine coastline- mostly rocky shores and 306 (10%) of Maine's islands. At time of program approval, locals required to adopt/enforce minimum shorelands zoning regulations. With passage of CPLURA in 1988, local comprehensive plans required and shoreline zoning as method to implement. SAMP- Locals required to designate "Resource Protection Zones" within 250 ft. of NHWL (including beaches, floodplains, steep slopes) under MSZA. Same shoreline regulations cover bluffs or rocky shores.			DATABASE Computerized permit tracking: YES Permit Outcome Data: NRPA/BEP Permits 1988-1995 HS: 304 SS: 110 Other: 214 NRPA/BEP Permit by Rule 1988-1995 HS: 9 SS: 82 Other: 12 LURC Permits 1972-1995 HS: 187 SS: 4 Other: 434 Local MSZA Permits HS/SS: no data Note: no linear data, no location data for state/local permits Case Example LP- 56 of 144 coastal communities have approved plans. The MSZA, all have setbacks- see under Regulatory Tools. SAMP- 36, 250 acres and 10% of shoreline protected as "Essential Wildlife Habitat" under all planning and regulatory tools combined MSZA, LURL, NRPA, ESA. However, % zoned as "Resource Protection districts" is unknown. No statewide database. Varies by type and extent of resource present. Case Example

Table 5. Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION										SUMMARY OF TOOLS EMPLOYED			Key provisions; setbacks; distance inland regulated/location; activities regulated; exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities; voluntary or mandatory local plans required; other enforceable plans.								
State	SB	CZ	SS	PA	VA	H	LD	LP	OP	SB-Setback	CZ-Control Zone	SS-Shoreline Stabilization Structures	LD-Local Permit Delegation	LP-Local Planning	S-Special Area Management Plan (SAMP)	OP-Other Plan	OUTCOME DATA & SUFFICIENCY				
										PA-Pedestrian Access							Database, Permit Outcome Data and Planning Outcome Data				
										VA-Vehicular Access							(S) Sufficient Case Example				
										H-Habitat Areas Protected	O-Other										
MD	Y	Y-2	Y	Y	Y	Y	Y	Y	Y	Beachfront	SB- Beach Erosion Control District. Setback 75 feet from NHW. Building setback runs along landward west edge of board-walk in Ocean City and behind dunes of Assateague Island. No construction seaward except fences and boardwalk when extends ~28 city blocks.	CZ- a) State BEP permits for any activity on coastal Sand dunes. b) State permit for MF and other development within shoreline zone of 250 feet from NHW.	SS- New and repair/rebuild allowed by permit. Nonstructural stabilizations encouraged.	PA- boardwalks, elevated dune crossovers regulated.	VA- vehicle traffic prohibited on beach.	H- bird nesting sites seasonally restricted.	O- sand mining, erosion control, beach replenishment.	LD- county zoning implements requirements of model ordinance with 75 feet setback.	LP- Requires county comprehensive plans/zoning to implement state Beach Erosion Control District Act standards.	OP- a) Beach Erosion Control District Plan--provides beach maintenance funds for shore erosion structures. Dunes restored, beaches renourished, erosion control projects-- see under Direct Land Management.	DATABASE Computerized permit tracking: YES, joint state and USACE Permit Outcome Data: HS: No data provided SS: 4238 permits (9 yrs-1986-1995) 367 plantings/sand fill However, No linear data LP- 1 county/1 city (100% oceanfront) approved plans with setbacks and dune mgt. plans. No outcome data on results
MA	n	Y	Y	Y	Y	Y	Y	Y	Y	Shoreline	CZ- State Waterway Permit for any new construction/fill on tide-flowed tidelands and filled tidal flats between waterway and first public way, or 250 feet from water. State performance standards of resource areas including coastal beaches, dunes, barrier beaches, banks. No restriction on private rebuilding, but priority to relocating willing sellers. May impose permit conditions if project found to have significant impact on storm damage prevention. Exemptions- 7?	SS- State DEP permit required. Allowed if necessary for stabilization of shore, rehabilitation existing structure, if minimize encroachment in waterway. Seawalls, bulkheads, revetments locate landward of MHW, except tieback, slope stability and abutting below MHW. Encourages nonstructural alternative where feasible.	PA- boardwalks, cross-overs regulated.	VA- Local Beach Management Plan required if locals permit ORV activity on beach.	H- natural heritage and endangered species habitat areas.	O- Sand scraping and sand mining regulated.	LD-Local Conservation Commission permits projects within 100 feet of the 100-year floodplain or 100 feet of bank of beach, dune, flat, marsh, meadow or swamp. State performance standards for resource areas including coastal beaches, dunes, barrier beaches, banks.	LP- Local comprehensive plans/land use plans voluntary. Cape Cod Commission requires local comprehensive plan for all activities (traffic, buildings) not just CZM.	SAMP - Areas of Critical Environmental Concern (ACECs) delineated and designated by state cover 75,000 acres.	OP- Local Beach Management Plans encouraged and required if ORV allowed on beach. MCZMP Barrier Beach Management Guidelines as TA to local planning to help communities develop plans for all locally-owned beaches. To qualify for funding through DCS, municipalities must have developed an open space and recreation plan for the area.	DATABASE Computerized permit tracking: YES Permit Outcome Data: HS/SS: No data provided by state Case Example SAMP -14 coastal ACEs designated/adopted. 75,000 acres of resources protected. No linear data. No results data. Other- 8 local barrier beach mgt. plans approved. No linear/area data. No results data.

Table 5: Regulatory and Planning Tools Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

State	TYPE OF REGULATION					SUMMARY OF TOOLS EMPLOYED Key provisions: setbacks, distance inland regulated, activities regulated; exceptions, shoreline stabilization regulations, regulation of access, habitats regulated, other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.	OUTCOME DATA & SUFFICIENCY Database, Permit Outcome Data and Planning Outcome Data
	SB	CZ	SS	PA	LD		
				VA	LP	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected O-Other CZ-Control Zone LD-Local Permit Detention LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
MI	Y-2 FT /R E	Y-3	Y	Y Y Y Y	Y n n Y	Sand Dunes/Bluffs/Shoreline SB- (1) Sand Dunes Setback of 100 feet landward from the crest of the first landward ridge that is not a foredune. (2) Bluffs High Risk Erosion Area Setback landward of 30-year erosion projection along receding bluff line. In 1992, 15 feet added to setbacks to address severe short-term erosion events. Also expanded to cover non-bluff areas. Small structures (<3,500 sq. ft. foundation and >5 units) must be moveable if built between setback and 2 times setback distance. Larger structures-setback doubled. Exceptions: site too narrow/sleep for moveable structures. Exceptions- construction on parcels/substandard lot prior to designation if moveable, waste system landward, landward as possible, meets engineering standards, etc. Also additions to nonconforming structures if moveable or foot print d/n exceed 25% of foundation. CZ- (1) Sand Dunes- Permits required with designated critical dune areas. Covers land lying with 2 miles of Great Lakes OHWM. Also may regulate land with 250 feet of critical dune area. Regulates development, sitvaculture and recreation affecting dune areas/contour change. State requirements: cannot build on slope 25-33% w/o registered plans, >33% w/o special exception, sitvaculture prohibited, 100 foot setback; if structure with 100 feet of dune crest, standards to ensure dune stability; special use projects regulated (C, I, MF>3 acres, density> 4 units per acre). Variances- rebuilding of nonconforming structure with critical dune area if build prior to act and destroyed by fire/non-erosion forces. Also nonconforming lot prior to Acre, made nonconforming due to erosion. (2) Bluffs- Permit required with High Risk Erosion Area which extend landward from OHWM as far as 1,000 feet inland from recession and covers all areas w/erosion of 1 foot or greater per year over past 15 years. Setback requirements: (see above) Allows reconstruction of substantially (non-erosion) damaged structures if moveable, not in zone of imminent danger. If completely damaged, new requirements apply. (3) Earth change permit for changes to natural cover or topography within 500 feet of a land or stream including the GL. SS- must be designed to meet/exceed 20-year storm event for small structures; 50 year storm event for large structures. Must be constructed at least 30 feet from erosion zone and landward of zone of imminent danger. Escrow required for maintenance of erosion control device in front of large structures. Exception to minimum setback based on engineering. PA- regulates beachfront stairs, boardwalks, trails. VA- restrict vehicles along 23% of the coast. H- designated natural preserves, critical dune areas, high erosion areas O- nearshore mining, sand scraping and dune reshaping regulated. LD- authorized to zone within 100 feet of OHWM of Great Lakes. Optional Local Sand Dune Protection Ordinances based on Model Zoning Plan/State requirements for critical dune areas. OP- a) Sand Dune Protection and Management Act & b) Shorelands Protection and Management Act, both essentially regulatory programs with local zoning including designated critical dune areas, high erosion areas that meet state requirements. c) Soil Erosion and Sedimentation Control Act both a planning and regulatory tool. Plans/educates on need for soil erosion control, local implementation. Rock Shore Management- Need information.	DATABASE Computerized permit tracking. YES Permit Outcome Data: HS: 705 homes (6 years- 1989-1995) SS: 1698 (6 years 1989-1995) PA: 200-250 projects VA- prohibited along 23% of coast H- 300 miles critical dunes; 250 miles natural preserves; 310 miles high risk erosion area. For HS/SS, no linear data Some relocation data. Case Example OP- a) and b) see above (c) no data
MS	n	n	Y	Y Y Y Y	n Y n n	Beachfront Note: All beaches are artificial and open to the public. No regulation of beaches/dune above MHW. (Coastal Wetlands regulations, but no permit required for SF) SS- permit or consistency certification required for SS. Repair/rebuilding allowed. PA- boardwalk to only beach park. VA- no vehicles allowed on the beach. H- bird nesting sites O- sand scraping and sand mining for beach nourishment regulated LP- One voluntary local coastal land use plan adopted. Voluntary beach/dune management plans are utilized in two counties on public beaches.	DATABASE Computerized permit tracking. NO Permit Outcome Data: 1990-1995 HS: none on beach SS: 12 permits No linear or Area Data LP- no linear/area outcome data.



Table 5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION						SUMMARY OF TOOLS EMPLOYED	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	LD	exceptions, shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.	Database, Permit Outcome Data and Planning Outcome Data
				VA H O	LP S OP	SB- Setback PA- Pedestrian Access VA- Vehicular Access H- Habitat Areas Protected CZ- Control Zone LD- Local Permit Delegation LP- Local Planning S- Special Area Management Plan (SAMP) OP- Other Plan	(S) Sufficient Case Example
NH	Y-3 FT	Y	Y	Y n Y Y	Y Y n Y	Shoreline SB- (1) Tidal Buffer Zone extends inland 100 feet from HOTL bordering tidal waters. No structures on beach/dune unless in public good. Effective 1993, allows building on relic dunes. Exception- rebuilding existing structures, activities in public benefit, building on relic dunes. (2) Shoreland development setback of 5 feet from MH-W for primary structures. (3) 75 feet setback from coastal waters for septic tanks. CZ- (1) Tidal Buffer Zone extends inland 100 feet from HOTL bordering tidal waters. All dredge and fill in wetlands regulated. Covers beaches and dune areas. Regulates in-filling of back dunes and building on relic dunes. (2) Shoreland Development Permits required from OHTL landward 250 feet. Standards for cutting veg., septic & building setbacks, lot sizes and disturbance of terrain. Exceptions- agriculture, forestry, state port authority, special local urbanized area on petition. (3) DES Subsurface disposal permits statewide with setbacks from water bodies. SS- state permit for SS. No restriction on reconstruction. SS considered in public interest and generally allowed for protection of upland structures. Major project if in dune, tidal wetland or within 100 feet of HOTL. Minor project is beach replenishment <10 cu yd or removal rock, gravel, sand <20 cu yd. Minimal impact projects-repair retaining walls. PA- construction of boardwalks and accessways regulated. VA- no H- condition of dune and value of habitat a permit consideration. Natural Sites protected but all public. O- mining of sand and gravel regulated. LD- Local Shorelands ordinances based on state standards. No local delegation of wetlands permits. LP- LCPs voluntary and not part of CZMP. Effective 1991, Comprehensive Shorelands Protection Act requires local protection ordinances with setbacks based on state standards. See under Regulatory tools. OP- a) Hampton Harbor Inlet Management Plan for placement of dredged material on Hampton Beach. See under Direct Land Management Tools. b) Seabrook Beach/Dune Plan- See Under Direct Land Management Tools. RS- same regulations as SB and CZ above.	Database Computerized permit tracking: YES, new in 1995. No data entries yet. Permit Outcome Data: HS/SS: No (6 months from paper files) OP- a) and b) See under Direct Land Management Tools
NJ	Y-3 E FT	Y-2	Y	Y Y Y Y	n Y n n	Beachfront SB- (1) V-zone Setback: residential prohibited. Exception- some beach-related commercial permitted. (2) Erosion Hazard Areas setback along Atlantic based on 30 year erosion rate for 1-4 dwelling units, and 60 yr. for larger structures. Baseline for setback varies by site (crest of coastal bluff, dune crest, first line of vegetation, landward edge of 8-ft. elevation). Erosion rate calculated on case-by-case basis. Within EHAs, new development prohibited. Exceptions- Single-Family and duplex infill and shore protection. (3) All permanent structures must be setback 25 feet from shore protection structures. CZ- (1) state DEP permit for all facilities (C, I, housing >24 units) within CZ extending inland to 777. In 1994, SF added as a regulated activity. In 1988/1990, expanded regulation to include activities from MH-W landward 500 feet. Covers SF, C, SS. (2) Erosion Hazard Areas covers erosion rate areas and uses setbacks (see above). (3) DEP rule limit development permits based on growth, environment, development potential and divided into 14 areas. Barrier Island designated "extension region." For "barrier island corridors" new/expanded development allowed and no restrictions on repair, rebuilding, relocation of damaged structures. However, DEP rule prohibits development on dunes, overwash areas, beaches and coastal bluffs except where no prudent/feasible alternative. SS- allowed by permit in areas where most new development prohibited based on 7 conditions such as WD, public use, protect existing structures/infrastructure in developed urban shoreline areas. Nonstructural solutions preferred. PA- boardwalks, crossovers regulated. VA- local level restriction. H- 15 miles restricted for bird nesting O- Dune creation, sand scraping and sand mining regulated.	DATABASE Computerized permit tracking: YES Permit Outcome Data: HS: No data provided SS: ~40 (25 years 1970-1995) 30 Emergency (11 yr 1984-95) Boardwalks: 2 (1994-1996) No linear or area data No resource impacted data

Table 5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	Key provisions: setbacks; distance inland regulated/location; activities regulated; exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required; other enforceable plans.	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	PA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected O-Other	CZ-Control Zone LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
NJ	Y-3 E FT	Y-2	Y	Y Y Y Y	Y Y Y Y	n n n n	Beachfront (Continued) LD- state retains permit jurisdiction. LP- Local plans are voluntary under NJCZMP. However, if adopt Local Coastal Land Use Plan or beach Management Plan must meet state standards, requirements, approval. Some local plans and construction line ordinances seaward of which construction is prohibited OP- a) Coastal Erosion Hazard Management Plan under development. Will coordinate state and coastal municipalities beach erosion control efforts. b) In 1992, State Development and Redevelopment Plan (SDRP) adopted. Original State Comprehensive Plans excluded coastal areas. Exclusion removed as part of CAFRA Amendments in 1992. NJCZMP and State Planning Commission working together to adopt new rules/regulations for SDRP for coastal counties and municipalities. State's coastal policies will be revised to incorporate the planning policies and land use criteria in SDRP to provide for statewide planning for the coast. Goal of SDRP is to channel development to preserve important natural resources, encourage development where there is existing infrastructure, and minimize adverse impacts of development.	LP- 151 local Coastal Land Use Plans and Beach/Dune management Plans approved. No linear or Area Data	
NY	Y R/ E	Y	Y	Y Y Y Y	Y n n n	Y n n n	Oceanfront Shoreline SB- Within EHAs, prohibits nonmoveable structures and major additions. CZ- Coastal Erosion Hazard Area (EHA) permit required for any activity in a designated erosion hazard area (EHA) and natural protective feature areas based on state standards. Covers Atlantic Ocean, Long Island Sound and lands adjoining the shores of Lake Erie and Ontario. EHA defined as portion of the coastline that is 1) a natural protective feature (beach, dune, shoal, bar, spit, barrier island, bluff, wetlands and assoc. natural veg) or 2) structural hazard area (40-year erosion areas). Within EHAs, prohibits nonmoveable structures and major additions. Exceptions: Moveable structures permitted if reasonable/necessary, will not increase erosion. Permits also required to relocate structures and relocation required if structure w/in 10 feet of receding edge. SS- permits dredging, sand by- pass, beach nourishment, new docks and SS. Allows repair/reconstruction without a permit. However, any change or modification (bigger or longer) subject to CEHA regulations. PA- permits commercial boardwalks. No permit required for walkways/stairs for individual property owner use. VA- local permits generally required. Must drive seaward of upper debris line or toe of primary dune, not on vegetation. H- 50 miles of beachfront bird nesting sites; 200 designated fish/wildlife habitat areas. O- Dune creation, sand scraping, sand mining regulated. LD- Local Erosion Management Plans and regulations cover 20% of beachfront. OP- a) Local Waterfront Revitalization Plans - very broad, deals with all aspects of coastal community. b) Local Coastal Erosion Management Plans- Locals regulation erosion based on state standards. Beachfront - No data collected on Great Lakes Shoreline of New York.	DATABASE Computerized permit tracking: YES Permit Outcome Data: HS: no permit data SS: no permit data (local data on % in riprap and seawalls for 5 Long Island Sound counties) OP- a) 115 plans approved. No results data. b) 2 Erosion Management Plans approved. Management area covers 25 miles (20%) of beaches.	

TYPE OF REGULATION

SUMMARY OF TOOLS EMPLOYED			
Key provisions: setbacks, distance inland/regulated/location, activities regulated, exceptions, shoreline stabilization/regulations, regulation of access, habitats regulated, other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.			
SB-Setback	SS-Shoreline Stabilization Structures		
PA-Pedestrian Access	LD-Local Permit Delegation		
VA-Vehicular Access	LP-Local Planning		
H-Habitat Areas Protected	S-Special Area Management Plan (SAMP)	OP-Other Plan	
<b>Beachfront</b>			
SB - Ocean Erovable AECs-Erosion rate setback based on size of structure. >5,000 sq ft setback farthest of: 1) 30 year annual erosion rate; 2) behind the crest of the primary dune; 3) behind landward toe of the frontal dune; 4) 60 feet landward from the first line of stable vegetation. Exception-for lots platted before June 1, 1979 if they cannot meet the 30 times setback; they must be back as far as possible and in no case closer than 60 feet landward of first line of vegetation). For structures greater than 5,000 sq. feet, setback 60 year annual erosion rate or 120 feet from mean vegetation lines.			
CZ-CAMA permit program in designated areas of environmental concern (AECs). State permit for major developments (20 acres/ 60,000 sq. ft.) within AECs. Local permits for minor developments (SF) within AECs. Development must conform with state standards for each category of AEC and local land use plans for each AEC. Also General permits for routine major development projects such as private piers, etc.			
Ocean hazard areas on barrier islands, beaches, frontal dunes, and inlet lands vulnerable to erosion consist of 4 types of AECs: 1) ocean erodible area, 2) high-hazard flood area, 3) inlet hazard area and 4) unvegetated beach area.			
Ocean erodible AEC areas extend from mean low water line to a variable distance inland depending on erosion in the vicinity varying from 145 feet to 700 feet. Within this area, all development must be located landward of an erosion setback line based on the size of the structure. (see above)			
SS-Effective 1985, no new erosion control devices designed to harden/stabilize beach allowed. Temporary sand bags and Beach nourishment allowed. Repairs to existing SS do not require permits, however replacement requires CAMA permit.			
Exceptions- emergency DOT SS to protect historic sites, groin at N. end of pea island to protect bridge foundation across Oregon Inlet-the only road access to the barrier island. CRC policy preference for beach nourishment and relocation of structures. PA- structural accessways require permits. VA- local level restrictions. H- 100 miles of undisturbed areas.			
O- Dune creation, sand scraping, dune reshaping regulated.			
LD-Mandatory local planning in 20 coastal counties/70 municipalities. Local permits are needed for minor developments within AECs. (see above) Effective 1993, all coastal counties required to have hazard mitigation element of land use plan w/enforceable policies on post-storm rebuilding.			
LP- Mandatory local land use plans with hazard mitigation element required effective 1983.			
OP- a) State Beach Management/Shoreline Erosion Response Plan with policies, designate ocean and inlet hazard areas-implemented through regulation-See under Regulatory Tools. b) Inlet Management Plans- same as above			
Shoreline SB- Setbacks within Shoreline APC: 0-35 feet no construction, 35-75 feet no structures that obstruct visual openness, 75-100 feet SF structures only.			
CZ-coastal permit program. Activities regulated with 4 APCs (shoreline, lagoons reef, wetlands/mangroves, ports/industrial) and major sitings w/in commonwealth. Shoreline APC extends 150 feet inland of MHW mark. - Covers ocean shoreline beaches and rocky headlands, not top of seaciffs. Setbacks (see above). Permit standards. Permit criteria. WD, compatible uses, SF with existing residential area, safe localities/resources protected, erosion controlled. Priority uses- public recreation of beaches, compatible WD uses, preservation. Moderate priority-agriculture, Low priority- C, MF, mining/quarrying sand.			
Unacceptable- new C, I non-rec., SF, waste disposal. Executive Order 15 established Territory-wide goals, policies, and priorities used implemented through regulation. Lagoon and Reef APC extends from MHW seaward to outer slope of barrier or reef fringe. High priority uses include prevention of beach erosion, conservation, public recreation, habitat preservation, WD projects. Lowest priority-dredging/filling. Unacceptable include taking of corals, etc. Exceptions- only outside APCs.			
Variances: if public, regional, national interest, emergency repairs, mitigation. (2) Earth moving permit island-wide for erosion/sediment prevention. (3) Submerged Lands license/lease			
SS- Allowed, but require CRM permit. Also covered under submerged land license/lease for petroleum/mineral extraction. H- no development in critical habitat areas- beaches, pristine marine areas. Offshore islands designated as wildlife sanctuaries- turtle nesting sites. O- on-shore and near shore sand mining regulated. Prohibits removal from public beaches. SAMP- Siapan			
agoon Use Management Plan.			

Table 5. Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION						SUMMARY OF TOOLS EMPLOYED	Key provisions: setbacks; distance inland regulated/location; activities regulated; exceptions: shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required; other enforceable plans.	OUTCOME DATA & SUFFICIENCY	
State	SB	CZ	SS	PA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected	CZ-Control Zone LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	OP-Other Plan	OUTCOME DATA & SUFFICIENCY
OR	y-2	y-3	y-3	y y y y	y y n y	Beachfront SB-(1) Under OIP interpretation, no new buildings in "beach zone." (2) LUPA Beach/Dune Goal 18- prohibits R, C, I buildings on beaches, active foredunes, other conditionally stable foredunes subject to ocean undercutting and wave overtopping, and intertidal areas/deflation plains) subject to ocean flooding. (V-zone). Excavations- in-filling developed areas where protection provided. On older-stabilized dunes, development allowed w/ vegetation retention and stabilization standards. CZ-(1) OIP permit for any improvement with ocean shore recreation area- land lying between extreme low tide and line of vegetation. No new buildings (de facto setback). Permits for stairs, pipelines, sand alteration, armoring (2) DSL Removal-Fill permit for >\$0 cu yds w/in area seaward of highest measured tide/vegetation line. Covers mainly riprap/seawalls. Exemptions- no permit required for revegetation/landscaping since considered beneficial use. (3) Oregon Land Use Planning Act sets enforceable statewide planning goals and guidelines which require federal/state/local consistency. Includes coastal goals to protect beaches and dunes. (see Goal 18 under setback above). Goals 5 and 19 require resource protection. Goal 7 requires safeguards before development in known hazard areas. Goal 17 Coastal Shorelands applies at least 100 feet landward of ocean shore and further in to cover significant coastal resources/hazard areas. Goals apply to both state and local permits. SS-(1) OIP permit and (2) DSL Removal-Fill permit and 3) Land Use planning Act goals for new beach erosion control devices. (see above). Must build as far landward as possible above MSL to prevent encroachment. All construction, maintenance and reconstruction of SS. Prohibits erosion repair on lots where no physical improvements (i.e., buildings, roads, water lines and sewer lines) on oceanfront lots platted before 1977. Allows emergency permit for a new improvement, dike, revetment, or for repair, replacement or restoration of an existing, or authorized improvement where property or properly boundaries are in imminent peril of being destroyed or damaged by actions of the Pacific Ocean or the waters of any bay. Goal 17 promotes nonstructural solutions to erosion problems and calls for erosion stabilization structures to be designed to minimize adverse impacts.	SS- Shoreline Stabilization Structures LP-Local Permit Delegation S-Special Area Management Plan (SAMP) OP-Other Plan	Database Beachfront Computerized permit tracking: YES Permit Outcome Data: PDR OIP Permits (1967-1995) HS: 1 SS: 202 Other: 64 Boardwalk: 12 DSL R/F Permits (1977-1995) HS: 0 SS: 238 Other: 27 LUPA Local Permits- no data on local permits No linear data, no data on resources affected LP- no statewide data on results. OP- 10 habitat refuges (4% of rocky shore, 7 research reserves (7%); 8 marine gardens (10%); 29 marine shores (79%) (S) Case Examples Bluffs- Case Example Rocky Shores: Case Example and see above OP.	

**Table 5. Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines**

TYPE OF REGULATION						SUMMARY OF TOOLS EMPLOYED Key provisions, setbacks, distance inland regulated/location, activities regulated, exceptions, shoreline stabilization regulations, regulation of access, habitats regulated, other regulations, Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.	OUTCOME DATA & SUFFICIENCY Database, Permit Outcome Data and Planning Outcome Data
State	SB	CZ	SS	PA VA	LD LP	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected O-Other SS-Shoreline Stabilization Structures LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
PA	n-	n-	y	n	y	<b>Beachfront(b)</b> No regulatory Program or and Local Plans for beaches/Dunes. Only major beach are is in public ownership. Presque Isle Peninsula State Park- See under Direct Land Management Tools <b>Bluff-front(BL)</b> SB - Under Bluff Recession and Setback Act, setback based on rate of recession times the life span of the structures which for residential is 50% years, commercial is 75 years and industrial is 100 years. Variances for new development on lots subdivided prior to 1980 if inadequate depth to setback. Substantial improvements prohibited. CZ - Local government planning and zoning applies within and landward of setback. SS- New SS allowed by permit from MHW lakeward. Submerged lands lease agreement required. Groins allowed 50 feet from water's edge. Program protects bluff from recession/erosion rather than minimizing beach erosion. No regulation over SS built above MHW line. H- 3.5 miles of bluff-front as David N. Roderick Wildlife Reserve LD - State delegates administration of Bluff Recession and Setback Act. LP - Bluff Recession and Setback Act sets state regulations along bluffs and requires local implementation through plans and ordinances. Bluff recession hazard areas designated by state. Minimum setback of 50 feet. Setback distance based on type of use times life span of structure. S - Presque Isle State Park	DATABASE Beachfront Computerized permit tracking: NA Permit Outcome Data: NA No regulatory program for beaches/dunes. State park covers 7 miles--See under Direct Land Management. Bluff-front LP- 8 approved plans with setbacks covers 50 miles (94% of bluff-front) (S)
PR	y-3 FT	y-3	y	y	n	<b>Shoreline</b> SB-(1) 6 meter public ROW on which no structures can be built (Spanish Water Law). (2) 20 meter public accessway Separation Zone setback for construction and subdivision and no permanent structures w/in 30 meters of separation zone results in 50 meter setback from Territorial Maritime Zone. (3) 2.5 times height of building setback for all structures erected w/in 400 meters of TMZ to prevent shadows on beach. Exemptions- urban zone lots approved prior to regulation, if structures on one or both sides setback less, if WID. CZ- Commonwealth-Wide Land Use Policies and Zoning Districts. (1) Permits from RPA based on PB regulations for activities 1000 meters inland from shoreline or farther to include important natural resources. Also includes all offshore islands. 14 Zoning Districts. In District CR -Conservation of Resources and CRR- Conservation and Restoration of resources, and PR- Resource Preservation, no subdivisions. Excavations in CR District for tourist-related recreation if in public interest/natural environment not affected. In District PP-Public beaches, subdivision and developed allowed for hotel/vacation facilities, tourist villas, restaurants, recreation, in whatsevs/docks, etc. (2) Flood Areas Permits from RPA based on PB regulations for activities in Floodprone zones. In Zone 1 (floodways) development, major renovations prohibited. Exception-existing structures cannot be expanded unless protected. Zone 1M(y-Zone) and Zone 2 (low areas) allows new development and modifications to existing subject to design/building requirements. Also relocation program in coastal high hazard flood areas. (3) In 1992, Maritime Control Zone and DNR Authorizations and Concessions over nonconforming uses in the maritime zone-which includes territorial waters, submerged lands, inland to reaches of low lands beneath by ebb/tlow of tides and mapped by DNR. SS-DNR permit required for SS. Few permitted. No policies. Relies on USACE standards. PA-No permits for boardwalks. But restriction on public access in some Zoning Districts. Also permits for uses in recreational areas and fees for use of recreational areas/facilities. Includes foot paths, trails, observation/watch towers. e.g., in Districts CCR and PR, access controlled to protect natural resources. VA- No cross-country vehicles in or adjacent to bathing beaches. Vehicular restrictions in some Zoning Districts. H- Natural Reserves and Special Planning areas, endangered species habitat protected. Beaches on certain islands protected. O-sand, gravel and stone extraction regulated, and removal of sand from sand dunes requires permit approval. SAMP-a) Natural Reserves; b) Special Planning Areas; c) Island of Culebra Pan	DATABASE Computerized permit tracking: NO, developing GIS database. Permit Outcome Data: 1 Year (July 1995-June 1996) HS: see below Resed- 120 Tourist- 24 Public 47 Rec- 41 Comm 34 Activity in Maritime Zone- 82 Marine Sports Event- 143 Total- 491 SS: unknown No linear data. No data by resource type Coastal Flood Hazard relocation- 1300 families relocated. SP- no data on zones, acres, etc. SAMPS a) 20 NRs designated- see under DLM b) 7 SPAs designated- see under DLM c) no outcome data

TYPE OF REGULATION

TYPE OF REGULATION					SUMMARY OF TOOLS EMPLOYED	OUTCOME DATA & SUFFICIENCY
RI					Key provisions: setback, distance inland regulated, activities regulated; exceptions: shoreline stabilization regulations, regulation of access, habitats regulated; other regulations. Local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans.	OUTCOME DATA & SUFFICIENCY Database. Permit Outcome Data and Planning Outcome Data
Y-4 FT E R	Y	Y	Y	n n Y n	<p><b>Shoreline-Beaches, Dunes, Bluffs, Rocky Shores</b></p> <p>SB- (1) 50 feet from inland boundary of coastal feature or 25 feet inland of edge of Coastal Buffer Zone up to 200 feet. <b>Exceptions:</b> W-D activities, minor modifications or restoration of structures conforming to standards.</p> <p>(2) Critical Erosion Area Setback in areas receding &gt; 2 ft. per year, 30 X annual erosion rate &gt; 4 units; 60 X annual erosion for C, 1, DU &gt; 4 units. Setback measured from landward edge of foredune zone defined as 25 feet landward of dune crest.</p> <p>(3) Dunes construction setback line on 3 barrier beaches. No building seaward of line based on utility/wall of existing development. Amended 1995- see above.</p> <p>(4) Construction Prohibition Areas- No new construction on sand dunes; beach face; undeveloped barrier beaches. <b>Exception:</b> beach/dune stabilization, public access, sanitary or recreation facilities, protect public welfare.</p> <p>CZ- State CRMC permit (Assent) for activities inland 200 feet from a "coastal feature" which includes a) beaches/dunes; b) barrier beaches; c) coastal wetlands; d) coastal bluffs, cliffs, banks; e) rocky shores; f) manmade shoreline. Also regulates 7 categories of activities inland of shoreline features: 1) power-generating plants; 2) petroleum storage; 3) chemical/petroleum processing; 4) mineral extraction; 5) sewage treatment; 6) solid waste disposal; 7) desalination plants.</p> <p>CRMC permits tied to 1) Zoning of Uses adjacent to State Water Classification Areas; 2) Coastal Shoreline Features protection and 3) regulated activities. For Coastal Beaches and Dunes, construction on beaches adjacent to Type 1 and 2 waters and undeveloped dunes is prohibited. <b>Exception:</b> beach protection, restoration, renourishment, some SS. On Dunes, setbacks (see above). Alteration of foredunes adjacent to type 1 and 2 waters prohibited except non-structural protection/restoration, accessways to beach. Alteration adjacent to type 3-6 waters permitted if designated priority use, alternative considered, etc.</p> <p>For all Barrier Beaches, new infrastructure prohibited, for undeveloped barrier beaches, construction/alteration prohibited. Only nourishment, dune stabilization, natural features protection. On developed barrier islands, new construction prohibited on barriers on which only roads, utility lines, infrastructure present as of 1985. On moderately developed barrier beaches, new development prohibited. <b>Exceptions:</b> restoration/preservation, existing infrastructure, and existing recreation may be maintained/expanded/rebuilt if destroyed.</p> <p>SS- regulated. Nonstructural measures preferred. If SS proposed, must exhaust alternatives including relocation of structure and nonstructural measures. Prohibit new SS on all barriers in type 1 waters. Limit use of riprap to protect septic systems/ancillary structures. If SS permitted, must demonstrate that erosion hazard exists and SS will control, nonstructural SS does not work, no reasonable alternatives, will not increase erosion, long-term solution and maintenance program/financial commitment. Repair/reconstruction &gt; 50% damaged requires new permit.</p> <p>PA- Guidelines for dune walk-over structures. Width 4 feet. May include small deck/view platform limited to 100 sq. ft. No permit required if guidelines met.</p> <p>VA- A. Coastal Beaches and Dunes: 1) vehicles prohibited on dunes except on trails marked expressly for vehicular use.; 2) vehicular use of beaches (where not otherwise prohibited by private/public management programs) required DEM Use Permit through DEM Division of Enforcement. Vehicles shall not be operated across protected (lifeguard) swimming beaches during protection period. B. Barrier Beaches- Prohibit: 1) vehicle access across back barrier flat to access Salt Ponds; 2) vehicles in vegetated areas anywhere on barrier.</p> <p>C. Dunes (1995)-Prohibit: 1) vehicles on dunes within 75 ft. of dune crest except on marked trails; 2) alteration of foredune zone adjacent to Type 1 and 2 waters, except for protection/restoration, no hard structures. D. Transportation policy- Section 550.0-2(E)(2) and (3) in reviewing transportation facilities shall address impacts on natural environment and habitat; and impacts on scenic, sensitive, productive and/or unique coastal natural features and areas such as wetlands, beaches, cliffs and bluffs.</p> <p>SAMP- a) Salt Pond Regions SAMP: Nileget to Point Judith Ponds b) Pawcatuck River Estuary and Little Narragansett Bay SAMP OP- e) Harbor Management Plans, 8 Plans, but not yet adopted as part of RICRMP. LP- State Comprehensive Plan adopted in 1994 which requires local planning and regulation, but not part of RICZMP. H- Designated APRs protect habitat. Designated Conservation and Management Areas cover 9 barrier beach/dune areas where CRC permits protect areas. DEM Fish and Wildlife review CRC permits for habitat protection areas.</p> <p>O- beaches and offshore sand mining, sand dune alterations, dune revegetation regulated.</p>	<p><b>DATABASE</b></p> <p>Computerized permit tracking: YES Began in 1987, upgraded and input permit data back to 1971</p> <p>Permit Outcome Data: Tier 1- 200 ft. landward of C Feature 14 1/2 yrs (1971-1995) HS: See below DU- 3650 C/I: 539 SS: 1066 Nonstructural SS: 238 No linear data No resource area data</p> <p>SAMP- 2 Plans adopted affecting beaches/dunes. No data on Results</p>

Table 5: Regulatory and Planning Tools Associated with Regulating Construction &amp; Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION						SUMMARY OF TOOLS EMPLOYED	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected CZ-Control Zone O-Other SS-Shoreline Stabilization Structures LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
SC	Y	Y	Y	Y	Y	<b>Beachfront</b> SB-Setback from MHW to crest of primary oceanfront sand dune. No new/reconstruction except swimming pools seaward of baseline. CZ-SCCMA establishes state coastal policies used in regulatory decisions and local beach management planning. Regulates new/reconstruction w/in 40-year erosion zone. Prohibits destruction of beach/dune vegetation. Exception: If no feasible alternative. Structures permitted w/in 40-yr zone: 1) structures less than 5000 sq ft heated space; 2) and located as landward as possible; 3) no erosion control as part of building; 4) not built on primary dune. If vegetation damaged, mitigation required. Exceptions- swimming pools, other activities to avoid takings cases. No permits required for: hunting, fishing, research, walkways over sand dunes which follow established guidelines. Sand bags, sand scraping, and minor beach nourishment are also exceptions allowable under "emergency orders" and within established guidelines. Since 1990, restricts repair or rebuilding of beachfront structures destroyed beyond repair >66 2/3% of structure based on point system for building components left intact. Exemptions include habitable structures and pools damaged less than 66 2/3% may be repaired. There are no relocation provisions for structures in erosion-prone areas. Although state policy encourages retreat, no state program. Procedures for requiring property owner to remove structure that is permanently located on the active beach, as a result of erosion and shoreline change. SS- Restricts new shoreline stabilization structures since 1988. No new erosion control structure or device allowed along oceanfront beaches and sand dunes in state jurisdictional boundaries, except structure to protect public highways which existed on June 25, 1990. Restricts reconstruction of shoreline stabilization structures since 1990. Between 6/90-6/95 structures damaged > 80% above grade cannot be repaired or rebuilt. Between 6/95 - 6/2005 structures damaged > 66 2/3% above grade cannot be repaired or rebuilt. After 6/2005 structures damaged >50% above grade cannot be repaired or rebuilt. Sand bags, sand scraping, and nourishment are also exceptions allowable within established guidelines under "emergency orders". PA- Construction of walkways over sand dunes are allowed as an exception if they follow guidelines under R. 39-13(C) including maximum width of 6 feet and other criteria. Otherwise permit required for handicapped and access wider than guidelines. Beachfront Boardwalk Permits 1988-1995: 12 VA- Restrictions for vehicular traffic include emergency vehicle access, construction/repair of drives and parking lots. Emergency Vehicular access permits 1988-1995: 13 H- Restrictions on beach nourishment during sea turtle nesting season. Restriction on sand fencing so as not to impede turtle nesting. Restriction on beach nourishment during sea turtle nesting season affect all 181 miles of beach. O- regulations covers fences, lighting, trash receptacles, sidewalks, signs, utility lines, drainage structures, golf courses, new fishing piers, sand scraping, sand bags. LD- Since 1990, locals required with strategy for 40-year retreat and setbacks. However, state did not delegate permitting authority. LP-Local Beach Management Plans required under 1990 Amendments including regulatory setbacks and 40-year retreat plan. OP- in 1992, State Beachfront Management Plan adopted to address erosion, beach nourishment and other management issues. State BMP covers entire beachfront of 181 mile and landward to cover frontal dunes.	DATABASE Computerized permit tracking: YES beginning in late 1980s Permit Outcome Data: 8 Years (1988-1995) HS: 35 1977-1987 SS: 307 1988-1995 SS: 0- except exempt areas No linear data No data on resources affected Case Example LP- 15 of 18 coastal communities with adopted beach Mgt. Plans. No statewide linear or area data. OP- no results data Case Example

Table 5: Regulatory and Planning Tools and Outcome Data Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION							SUMMARY OF TOOLS EMPLOYED	Key provisions: setbacks; distance inland regulated/location; activities regulated; exceptions; shoreline stabilization regulations; regulation of access; habitats regulated; other regulations. Local delegation of permit responsibilities; voluntary or mandatory local plans required; other enforceable plans.	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	VA	LD	SB-Setback PA-Pedestrian Access VA-Vehicular Access H-Habitat Areas Protected O-Other	CZ-Control Zone SS-Shoreline Stabilization Structures LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
VI	Y FT R	Y-2	Y	n n y y y	n n y y n	n n y y n	SB-Open Shore Act prohibits obstructions w/in 50 feet of MLT, or inland boundary of seaward boundary of natural barrier whichever is shortest. CZ-Coastal Land and Water Use Plan- sets Use Districts consistent with policies in VICZM Act. A) Coastal Zone Permit for major and minor permits w/in 1st tier whose landward boundary is mapped and based on features such as roads, landmarks, property lines, USGS contour lines, and uniform distance from MLT. Also covers all offshore islands and cays. Major permits cover activities on offshore islands and the 1st tier. Exception- if landward of MLT and minor activity which include: a) subdivision SF, Duplex; 2) improvements >\$52,000; c) dev. less than \$56,000; d) mineral extraction >\$17,000; e) emergency permits; f) maintenance/repair of permitted facility. B) CZ Permit incorporates 5 other state permits in the 1st tier: 1) Earth Change; 2) Submerged lands; 4) Use Permits under Zoning Law, and 5) Building, plumbing and electric permits. 2nd tier landward boundary includes all watersheds, adjacent areas and inland portions of 3 main islands. Permits include 1) earth Moving; and 2) Use Permits under Zoning Law. SS CZ Permit required for new SS. Reconstruction of SS allowed w/o permit and emergency repairs. Prohibited w/in 50 ft open shore setback. Siting policies to minimize adverse impacts. H-yes, but data limited on areas. 18 APCs designated. 13 cover recreational beaches, 9 cover sea turtle nesting beaches, 13 cover CBRA designated areas, 6 cover shore protection structure areas. O-offshore and nearshore dredging and sand and gravel mining regulated. SAMP- APC Management Plans adopted by Legislature in 1994.	DATA BASE Computerized permit tracking. NO Permit Outcome Data: 10/92-3/95 Permits Approved Major: 365 Minor: 374 HS: unk SS: unk No linear data No data on resources affected No statewide data on use districts SAMP- 18 APC Mgt. Plans adopted. 13 recreational beaches; 9 sea turtle nesting beaches; 13 CBRA areas; 6 shoreline protection structure areas. No statewide data on outcomes. No linear/area data.	
VA	Y E	Y	Y	Y Y Y Y	Y Y Y Y	Y Y Y Y	SB-30 yr. annual erosion rate or 20 time local recession rate for barrier islands. No permanent development/allocation of coastal primary sand dunes. Exceptions- public interest activities. Existing structures damaged within 20-year setback may not be rebuilt? CZ-Permits on Coastal Primary Sand Dunes and beaches. Setbacks required effective 1990 (See above). Permit required of certain uses -Need information on activities/uses regulated, and exemptions. SS-Effective 1990, new shoreline erosion protection structures prohibited under any circumstances. Prior to 1990, discouraged shoreline modifications in preference to nonstructural solutions. Exception- portions of Virginia Beach where private upland structures in imminent danger from erosion, bulkheads/erosion control devices and normal maintenance allowed. PA-no boardwalks, but dune cross-overs and nature trails regulated. VA-no vehicles allowed in specific areas of state parks. H-6 miles of sea turtle nesting sites protected. O-dune creation/vegetation and sand mining regulated. LD-designated counties/cities authorized to adopt coastal primary dune ordinances and issue local permits. LP-Voluntary and state provides model ordinances for local adoption/implementation. SAMP- Northampton County Sustainable Development Initiative began in 1991, enforceable policies for habitat protection and eco-tourism. Covers 209 square miles. OP-a) Shoreline Erosion Control Act provides TA to property owners, policy on dredge material for beach nourishment, and Board on conservation and development of public beaches. b) Erosion and Sediment Control Plan establishes standards/regulations for local erosion and sediment control regulations. Mandatory, but not part of approved CZMP.	DATA BASE Computerized permit tracking. YES but just now incorporating permit data into database. Permit Outcome Data: HS: no linear/area data SS: no linear/area data Less than 10 permits per yr. for activities in beach and dune area. LP-3 counties w/approved land use plans, setbacks. No linear or Area Data SAMP- No outcome data OP-a) no outcome data b) na	



Table 5: Regulatory and Planning Tools Associated with Regulating Construction & Shoreline Stabilization Structures on Beaches, Dunes, Bluffs and Rocky Shorelines

TYPE OF REGULATION										SUMMARY OF TOOLS EMPLOYED	OUTCOME DATA & SUFFICIENCY
State	SB	CZ	SS	PA	VA	LD	PA	VA	LD	Key provisions: setbacks, distance inland regulated/location, activities regulated; exceptions, shoreline stabilization regulations, regulation of access, habitats regulated; other regulations, local delegation of permit responsibilities, voluntary or mandatory local plans required, other enforceable plans	Database, Permit Outcome Data and Planning Outcome Data
										SB-Setback PA-Pedestrian Access VA-Vehicular Access CZ-Control Zone SS-Shoreline Stabilization Structures LD-Local Permit Delegation LP-Local Planning S-Special Area Management Plan (SAMP) OP-Other Plan	(S) Sufficient Case Example
WA	Y	Y	Y	n	n	Y	Y	n	n	SB- No state setback, but local regulations may contain setbacks CZ- Shoreline substantial development permit w/in 200 feet of shore. See under LD. SS- Hydraulic Project Approval required for construction in coastal waters including SS. Groins are no longer allowed and no new jetties have been built since 1985. VA- restrictions on beach driving. O- primary dune grading prohibited at local level or restricted. Near shore sand mining regulated locally. LD- Total local permit delegation subject to state review. Shoreline Master Programs (SMPs) issue permits. Permits required for substantial development (cost-\$2500 or interferes w/normal public use of waters/shores of state. Exception: need information. LP- Mandatory Local Shoreline Master Program with state certified plans and regulations.	DATABASE Computerized permit tracking: NO for local permits, YES for State Hydraulic Projects Permit Outcome Data: HS: no data SS: No data, database not coded for SS LP- all 5 oceanfront local governments have approved Shoreline Master Programs. No linear or area data
WI	Y	Y	Y	n	n	Y	Y	n	Y	SB- 75 ft. setback from OMHW for all buildings and structures, except piers, boat hoists, boathouses. CZ- State regulates development within 100 feet of OHWM. Setback (see above). SS- permit required for SS in navigable waters. PA- do not regulate boardwalks, shoreline accessways. VA- restricts vehicles w/in navigable waters. H- 300 areas statewide O- near shore sand mining regulated. LD- Locals administer state required setback through shoreline zoning ordinances. SAMP- Carol Beach protects unique coastal area dunes, ridges, swales covers both beach and wetland areas. OP- 3 Year Harbor Plan required for State Harbor Assistance Money	DATABASE Computerized permit tracking: YES for DNR, but no for CZM Federal consistency Permit Outcome Data: HS: No data (local permits) SS: 6422 (1949-1995) No linear or area data SAMP - 4-5-5 miles of shoreline. No other outcome data OP- No outcome data

[illegible][illegible]

# KEY

Y- yes, tool employed n- no, tool not employed  
 SB- Setback required  
 CZ- Coastal construction control zone, also referred to in some states as coastal construction control line (CCCL)  
 LD- Local Delegation  
 A- Access restricted through regulation of a) pedestrian boardwalk or dunes-crossover; or b) vehicular traffic  
 H- Habitat area restrictions  
 SS- shoreline stabilization structures (seawalls, riprap, revetment, groins, etc.)  
 SF- single family residential development  
 WD- water dependent activities  
 SF, MF, C, I - Single Family, Multi-Family, Commercial, Industrial  
 CR- coastal resources  
 na - not applicable  
 Case- case example provided which illustrates on-the-ground effectiveness of tool employed  
 USACE- United States Army Corps of Engineers  
 MHW- Mean High Water  
 MHT- Mean High Tide  
 MLT- Mean Low Tide  
 SHW- Seasonal High Water  
 NHW- Normal High Water  
 OHWM- Ordinary High Water Mark

## TYPES OF PLANS

SP - State Level Plans- Covers State Comprehensive, Land Use, or CZM Policy Plan and all tied to regulatory tools for implementation  
 LP- Local Plan both land use and implementing zoning, subdivision, other ordinances.  
 SAMP - Special Area Management Plan  
 O - Other State Plans which address resource management areas: Beach Erosion Plan, Intel Management Plan, Harbor Management Plan, Rocky Shore or Bluff Management Plans

## OUTCOME DATA AND SUFFICIENCY FOR ANALYSIS

(S) - Sufficient- Tool used and sufficient data to analyze outcomes.  
 (na) - not applicable, no planning tools employed, or dominated by regulatory controls  
 Case Example- example provided which illustrates effectiveness in a local area

Note: Regarding Rocky Shores, the submerged lands below HHT are generally in state, commonwealth or territory ownership. Development regulations tend to apply to water-dependent activities such as docks and piers.

## KEY

R- Regulatory Tools  
 P- Planning Tools  
 L- Direct Land Management Tools  
 A- Acquisition Tools  
 na- not applicable  
 no data- no statewide data, either linear data or acreage data, on program results or outcomes on-the-ground  
 17 States with Rocky Shores: AK, AS, CA, CT, GU, HI, ME, MA, MI, NH, NM, OR, PR, RI, VI, WA, WI  
 16 States with Bluffs: AK, AS, CA, CT, GU, HI, ME, MI, PA, NM, OR, PR, RI, VI, WA, WI  
 12 States with No Coastal Rocky Shores: AL, DE, FL, LA, MD, MS, NJ, NY ocean coast only, NC, PA, SC, VA  
 13 States with No Coastal Bluffs: AL, DE, FL, LA, MD, MA, MS, NH, NJ, NY ocean coast only, NC, SC, VA

Source: State CZM Profiles

Version 1/1/97

Table 6. DIRECT LAND MANAGEMENT AND ACQUISITION TOOLS AND OUTCOMES associated with state management of beaches, dunes, bluffs and rocky shores and acquiring additional areas.

State	Open Coast Miles	Open Coast % Public	Beach Miles	State C. Mi. Parks	State C. Parks Acres Bc	State C. # Parks Beach	Board-Walks/ Dune Cross-Overs	Critical Coastal Erosion Areas	Dunes Reveg. # proj./ ft/mile	Beach Nourish. Fed. # proj. State # & mi	Armor Project Fed. State	Natural Protection Areas	Coastal Lands Acquired (acres/miles)
AL	46*	10%	46	3 all beach	6,000 all beach	1 all beach	Y-7	2 areas	1 500ft	n n	n n	40 acres for Perdido beach mouse, ~3 mi. sea turtles nesting season, 25 acres for terns.	n
AK	6640	99%	nd	nd	990,335	63	n	nd	n	n n	n n	49,000 acres protected for Bald Eagles	n
AS	128	~9%	nd	nd	nd	nd	n	20,000 ft	n	n n	n n	n	n
CA	1100*	47% 34%	nd	377 280	145,540 26,838	119 71	Y--20	4%	>19 nd	Y-7 Y-nd	Y-5 Y-12	Resource Mgt. Plans designate trails, roads, parking and zone units for reserves, preserves, habitat protection and public use. Endangered species habitat protected (bird nesting sites, etc. 408 acres Natural Area Preserve, 806 acres Coastal Reserve, Nature trail	B/D: 26,838 acre BL: yes-nd RS: yes-nd
CT	Long Is Sound 278*	LIS:20%	85	nd 6.75	nd 3003	nd 6	7-nd	nd	9 nd	Y-6 Y-1 25 mi	Y-2 Y-3		B/D: 1,439 acre
DE	24.5*	75% >62%	24.5	18	nd	3 all beach	2-bd/mk 3-cross	nd	Y-nd >15 mi	Y-2 Y-nd 6 mi	Y-1 n	Endangered species habitat such as piping plover - case by-case and during nesting season. Sea turtle nesting sites during season.	B/D: yes-nd
FL	1350	nd	827	~500 bch only	~11,500	24	Y-many nd	273 mi	100 mi	Y-26 Y-nd ~94 mi	Y-6 Y-nd		B/D: parcels: 990 acres: 294,968 miles: nd
GU	110*	nd	40	5.1 13%	nd	14 (only beach)	n	No Areas	n	n n	n n	28,197 acres (20.73% Guam total land area) and 15,600 acres submerged lands.	yes through trades -nd
HI	750	nd	185	16%	14,814 322	24 16	n	nd	n	n n	n n	Natural Reserve Area System Wildlife Sanctuaries Marine Life Conservation Districts	B/D & BL & RS properties: 62 acres
LA	397	~20% <1%	>4 mi d/n inc. barrier island shoreline	unk >1 mi.	unk 345	2	1	100%	Y-6 ~20 mi barrier islands	Y-2 Y-nd ~20 mi	Y-1 Y-20	n	n
ME	228	5% >4%	23 B/D 20% S 205 RS	nd 4.6	11090 2380	25 10	3	1%	Y-5 4 mi.	Y-6 COE Harbor Proj. >1 mi	n n	3 state beachfront parks dunes protection, pedestrian accessways; sea bird nesting sites fenced off during nesting season. 1 Rocky Island Sanctuary-access restricted	B/D & BL & RS properties: 8 acres: 4828 miles: ~20

Table 6. DIRECT LAND MANAGEMENT AND ACQUISITION TOOLS AND OUTCOMES associated with state management of beaches, dunes, bluffs and rocky shores and acquiring additional areas.

State	Open Coast Miles	Open Coast % Public % State	Beach Miles	State Mi Parks Mi Beh P	Coastal Acre Pks Acre Beh	Parks # Parks # Beh Pk	Board-Walks/ Dune Cross-Overs	Critical Coastal Erosion Areas	Dunes Rev. # proj / ft/mile	Beach Nour. Fed. # proj. State # 8 mi	Armor Project Fed. State	Natural Protection Areas (2)	Coastal Lands Acquired (acres/miles) B/D Beach/Dune Bl Bluff RS Rocky Shore CA Coastal Area
MID	32*	nd ~50%	32	17	nd all beach	3	1	Assateague Island	Y-1 2 mi	Y-2 10 mi	Y-1 Y-nd	Seasonal restrictions for nesting birds along entire beachfront.	parcels: 2 acres: nd miles: 2
MA	222*	nd	222	64 nd	nd nd	18 nd	nd	S. Nantucket et Island	Y-nd	Y-5 Y-nd 3 mi	Y-2 Y-nd	5 coastal pk. mgt. plans for 4,673 acres 14 ACECs covering 75,000 acres.	State Acres: 2250 miles: nd Local Grants Projects: 17 Acres: 273 miles: nd
MI	Great Lakes 3,268	GL 30% nd	270 50%-S	114 nd	nd	29 nd	nd	350 mi high risk areas	n	n	n	- 860 miles total -250 miles natural preserves -300 miles critical dunes areas -310 miles high risk erosion areas	136,000 acres statewide coastal: nd
MS	44	30% 17%	18	nd	nd	1	1	Jackson Co.	n	Y-2 Y-1 18 mile	Y-1 n	n	n
NH	18*	78% nd	10.2 B/D 100%-P 88%-S 7.8 RS	12.5 10.1	~580 101	16 9	1	7 areas	Y-2 nd	Y-3 Y-5 2 mi	Y-2 Y-3	Pedestrian access restricted area, 5 acres, piping plover nesting site.	B/D & RS acres: 131 Miles: nd
NJ	125*	74% 9%	125 9% state	12	3192	2	n	nd	n	yes-8 Y 27 mi	Y-4 Y	B/D acres: 2,500 miles: 11.57 included 100 acre bird sanctuary, 1,200 acres beach research/wildlife sanctuary, 1,000 acre beach nature area, 3 other nature areas 1201 acres. 7 protection areas covering 566 acres in site parts. >50 miles beachfront bird nesting areas. 200 fish/wildlife habitat areas.	n
NY	125*		125 30%-s	46.5 all beach	11,600 all beach	10 all beach	3	nd	n	Y-8 Y-nd	Y-4 n		CA: 2000 acres
NY	Great Lakes	no data	collected	for Great Lakes	portion of	New York	Coastal Zone.						see above
NC	320*	nd 3.4%	320 3.4%	nd 11 mi	nd	3	2	50%	Y-nd	Y-6 Y-12 5 mi	Y-2 n	31.4 miles plus spoil islands, 100 miles undisturbed areas/Reserves, 50 acre nesting colonial birds, 11 miles sea turtle nesting.	7,000 acres beachfront 27,439 beach access sites
NM	184*	nd	nd	nd	nd	nd	n	nd	n	n	n	Offshore islands as bird sanctuaries, beaches as turtle nesting sites	n

Table 6. DIRECT LAND MANAGEMENT AND ACQUISITION TOOLS AND OUTCOMES associated with state management of beaches, dunes, bluffs and rocky shores and acquiring additional areas.

State	Open Coast Miles	Open Coast % Public % State	Beach Miles	% Public % State	State Mi Parks Mi Bch P	Coastal Acres Plus Acres Bch	Parks # Parks # Bch Pk	Board-Walks/ Dune Cross-Overs	Critical Coastal Erosion Areas	Dunes Reveg. # proj / ft/mile	Beach Nouris. Fed ** # proj State # & mi	Armor Project Fed ** State	Natural Protection Areas (2)	Coastal Lands Acquired (acres/miles)
OR	362*	58% 36%	262 B/D 56%-P 30%-S 100 RS 65%-P 53%-S	128.5 76.3-B/D 53.2-RS	27,107	64	nd	n	13%	n	n y-1 >1 mi	n	Vehicles prohibited on 70% of coastline. State park mgt. trails, restricted access.	B/D & RS acres: 94.3 miles: .75 B/D only
PA	Great Lakes 120* Lake Erie 63*	20% nd	Lake Erie 10-B 99%-S 53-BL 11%-P 10%-S	Lake Erie 13.4 9.9 B 3.5 BL	Lake Erie 3110 10 B 3100 BL	Lake Erie 2 1	n	Lake Erie All 10 mi Beach 50 mi bluff (94%)	n	y-2 y-1 area 6 mi	y-1 y-1	Lake Erie only n-beach y-D. Roderick Wildlife Refuge	B/D: Spoils. mile: .25 acres: 10 BL mile: 3.5 acres: 3100	
PR	311*	nd	154	nd	nd	nd	15	n	nd	n	n	n	19 Nature Reserves and 8 Special Planning Areas	n
RI	40	nd	27.3 64%-S	nd	1501	14	nd	y-1	nd	n	n	y-1	All undeveloped barrier beaches	y-nd
SC	181*	42% 36%	181	68	nd	4	4	26 miles (30% of dev coast)	y-3 58 mi	y-1 y-4 45 mi	y-1 y-nd groins repair	68 miles in parks/wildlife preserves.	y-nd	
VI	nd 175 (tidal)*	nd	nd	nd	nd	nd	nd	n	nd	n	n	n	Salt River Bay	n
VA	200*	nd	200 10%-S	6	4700	1	n	2 co.'s 1 city	y	y-1 y-5	n	n	6 miles sea turtle nesting at False Cape.	y-nd
WA	171*	nd	60 B 111 RS	nd	27,000	120	nd	7-nd	yes-varies All Bluffs	n	n	n	Many- 7 areas with >6336 acres harbor seals, falcons, eagles and other bird nesting areas.	75,000 acres statewide coastal: >10,748 acres
WI	Great Lakes 820	nd	820 10%-B 72%-BL 8%-RS	nd	nd	30	nd	y-several nd	30%-mainly bluffs	n	y-4 n	y-nd n	~300 natural areas statewide coastal: nd	637 acres: 77 beach/560 dunes
Total	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	

Sources:  
 State CZM Profiles  
 \* CZM Profile coastline miles data differs from General Coastline mile data in U.S. Department of Commerce, NOAA 1975. The Coastline of the United States.  
 \*\*US Army Corps of Engineers, Shoreline Protection and Beach Erosion Control Study, Phase 1: Cost Comparison of Shoreline Protection Projects of the U.S. Army Corps of Engineers.

## APPENDIX D: CASE EXAMPLES

Case examples have been provided for the following states: California, Connecticut, Delaware, Florida, Guam, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Puerto Rico, Rhode Island and South Carolina.

### CALIFORNIA

#### CA-1 ReCAP Santa Cruz County and Monterey Pilot Study

#### CA-2 Beach Sand Mitigation Fund-- In Lieu Mitigation for Impacts of Seawalls on Sand Supply

#### CA-3 State Coastal Conservancy Projects

#### CA-4 Local Coastal Program Implementation - Dunes Protection

#### CA-5 Local Coastal Program Implementation- Bluff Protection

#### CA-1 ReCAP Santa Cruz County and Monterey Pilot Study

The California Coastal Commission (CCC) undertook a pilot Regional Cumulative Impact Project (ReCAP) to study development impacts along a 83 mile-long coastal stretch covering the two central California coastal counties of Santa Cruz and Monterey. This study provides an in-depth look at the effectiveness of the implementation of the CC Act policies relative to coastal hazards, wetlands protection, and public access.

Regarding hazards, the study looks at policies governing shoreline armoring activities, resource conditions as measured by changes in amount of armoring, and permit activity related to shoreline armoring. This study is relevant to protection of natural beaches, dunes and bluffs, since "Armoring along much of the coast in the ReCAP region has led to cumulative impacts to beach areas and public access opportunities. These impacts occur when shoreline devices are placed directly on the beach and by affecting the sand supply and landward retreat of the beach." (ReCAP: Executive Summary, p.3)

The study data shows increased growth pressures with population increasing 65% from 1970- and 1995 in the two-county area through in-filling and urban expansion. This is reflected in an increase of 43% in urban land uses in the past twenty years. From 1983 to 1993, there were over 3000 coastal development permits approved by the CCC and local governments of which 100 were for shoreline protection permits. Of these, 96 permits were approved for some type of shoreline protective device; 4 for beach nourishment. The armoring permits resulted in more than 2 miles of approved seawall activity and over 65,000 tons of approved riprap tonnage. Most are rip-rap or rock rubble revetments, with only 1.1 miles in timber seawalls without rock. Only 30 of the permits were for new revetments or seawalls; 63 for repair/maintenance or expansion of existing shoreline structures. One reason for the high number of permits involving modifications of existing structures is that riprap revetments require regular additions of rock for the structure to function effectively. In general such devices are concentrated in developed areas with erosive shoreline material and high incidence of storm wave attack.

*A major finding of the study is that the current coastal policies support the use of public shoreline and public resources to protect private property, and if the current situation continues, more and more of the public shoreline will be lost as a public resource.* On-the-ground outcome data indicates that, between 1978 and 1993, the percent of the shoreline armored in the ReCAP pilot area increased from 9.6 miles to 12.0 miles. Approximately one-eighth of the shoreline is now armored. This estimate does not include lengths of beaches protected by breakwaters, jetties, or groins, nor do the figures for length reflect maintenance and additions of rock to existing walls. Much of the increase in armoring between 1978 and 1986 is thought to have been constructed in response to storms in the late 1970s and early 1980s. Future demand for shoreline protection will depend on trends in development along the shoreline, erosion potential and storm frequency. Based on private property ownership, land use and physical characteristics, development patterns, and continued implementation of existing policies, it is estimated that 1/3 of the ReCAP coastline, or 27 miles, could be armored in the future.

There is no consistent regional approach to address areas prone to shoreline erosion. In many portions of the ReCAP area, the strategies used to provide shoreline protection differ greatly from one property to the next, in spite of physical similarities of sites. For example, within Live Oak along a 3,000 foot long section of Opal Cliffs, properties have been protected with gunite, vertical walls, rip-rap and concrete cylinders. The piecemeal approach to shoreline protective devices and generally not effective and have the potential to create further problems.

*Armoring has led to cumulative impacts to beach areas and access opportunities*, affecting sand supply and landward retreat of the beach. Along the ReCAP shoreline, data indicates that protective structures cover ~25 acres of beach. Permits granted since 1978 represent about 20%, or 5 acres of this total. Although shoreline armoring data indicates that armoring and encroachment has slowed under CZM, the impact from such encroachment may still be significant. Many of the armoring projects were approved in the popular recreational areas of Santa Cruz County.

Armoring is often put in place during emergency storm events. However, permits are approved with little or no technical analysis, review of alternatives, or review of mitigation for adverse impacts on resources, and no follow-up permit. Therefore, such projects do not receive full regulatory review or monitoring, and are usually in areas of significant long-term or storm related erosion. As a result impacts from these projects have not been fully assessed or mitigated.

*The policies governing shoreline development and building setbacks for much of the shoreline development in urban portions of the ReCAP pilot are often inadequate.* CC Act policies are inconsistent. One requires that new development be stable without construction of protective devices to minimize hazards. Another policy allows shoreline armoring to protect existing structures. There is no cutoff date for when a structure can be considered existing. Storm damaged structures are exempt from permits if reconstructed in same footprint thereby precluding more landward redevelopment, risks avoidance, and reduction of dependence on protective devices. Setbacks are a common LCP management approach to avoid armoring. However, most are based on long-term average erosion and do not incorporate episodic events which may exceed setbacks. This leads to structures in harms way and future need for armoring. In the ReCAP region, LCPs generally develop setbacks based on 50-year economic lifetime for new development. Those structures exceeding that lifetime will ultimately require armoring for long-term protection. Development on infill lots are allowed to be as seaward as adjacent existing development, exacerbating erosion risks and the need for armoring.

Current policy does not restrict development in areas of high hazard. Future development is likely to continue with adverse impacts on coastal resources and public costs involved in protecting private development. Regional Plans are recommended to address adverse impacts of shoreline armoring.

Source: ReCAP Pilot Project; Executive Summary and Findings and Recommendations.

#### **CA-2 Beach Sand Mitigation Fund-- In Lieu Mitigation for Impacts of Seawalls on Sand Supply**

In 1995, the CCC received requests for one long seawall to protect 12 properties within the same shoreline area along the Encinitas portion of the San Diego County bluff-backed sandy beach coastline. No armoring existed along the shoreline, but structures setback 10 to 30 feet were in danger due to episodic erosion. A few structures has been red-tagged by local governments as non-habitable structures. Since the bluffs contribute 40% of the sand in the littoral system, the CCC was concerned about loss of long-term sand supply from armoring. The result was a permit condition attached to the requests for shoreline armoring which required fees to go into a regional fund to pay for placement of sand on the beach within the same littoral cell area through offshore dredging or sand transport from inland sources.

To implement this permit condition, the California Coastal Commission in 1996 established a Beach Sand Mitigation Fund. Under a MOA, the Fund is administered by the San Diego Association of Governments(SANDAG). Funds are to be used for beach nourishment projects to provide sand to replace sand and beach area that would be lost due to the impact of the proposed shoreline armoring projects. Mitigation fees can be collected by the CCC through its



coastal development permit process. Fees address adverse impacts of proposed protective structures on local shoreline sand supply. Three quantifiable impacts from seawalls along shoreline backed by coastal bluffs, such as in Encinitas, are identified and include: 1) halting of natural bluff retreat, preventing a portion of the bluff material from becoming part of the sand supply; 2) halting landward migration of beach and nearshore profiles, preventing formation of beach that would otherwise be available to the public for use over time if the seawall were not constructed; and 3) physically occupying areas, by its encroachment seaward of the toe of the bluff that would otherwise be available for recreational use.

The fee is based on estimates of the loss of beach material and beach area which could occur over the life of the structure and the cost to purchase an equivalent amount of beach quality material and deliver to beaches in the project vicinity. The methodology for determining the in-lieu fee is based on estimates the total quantity of sand necessary to replace: a) the reduction in beach quality material contributed from the seacliff over the life of the armoring; b) the reduction in beach width which will occur when the landward migration of the beach profile is stopped, over the life of the structure; and c) the reduction in beach area which will occur from the seaward encroachment of the seawall.

SANDAG has adopted a Shoreline Preservation Strategy for the San Diego region. Through its Shoreline Erosion Committee, SANDAG monitors large scale projects, both in and out of the coastal zone, looking for "opportunistic sand projects" that will generate large quantities of beach material suitable for replenishing the region's beaches.

Applicants for shoreline stabilization projects are being required to pay a fee, in-lieu of depositing sand on the beach, because most are small projects and the costs would outweigh the benefits. Instead, the fees go into the fund which is used for a larger renourishment project to provide sand to the region's beaches.

### **CA- 3 State Coastal Conservancy Projects**

**Garrapata Beach Site Reservation:** In 1979, the Coastal Conservancy acquired 2.24 acre site on Big Sur coast with reefs, tidepools, and sea caves. The parcel is within the designated boundaries of the Garrapata Beach State Park. Conservancy, using tax law incentives, negotiated purchase price of \$155,000. Land intended to become part of Department of Parks and Recreation state park. (1980 Annual Report, p.20)

**Nipome Dunes Enhancement.** In 1990, the Coastal Conservancy acquired 2,500 acres in the heart of the Nipoma Dunes, California's largest and one of it's most spectacular coastal dune regions, bringing the goal of protecting the major part of the 12,000 acres dunelands and 18 mile shoreline a step closer. The property acquired has rare beauty and high biological value, a landscape of sand and wetlands. The \$2.6 million acquisition was \$425,000 below market value. The Conservancy had earlier, in 1986, acquired 567 acres of fragile dune habitat through a \$715,000 grant to the Nature Conservancy. Today, the "Nipomo Dunes Preserve," under Nature Conservancy management, encompasses about 4,000 acres but is expected to expand. The Coastal Conservancy remains active in the Nipomo Dunes, developing projects to protect scenic and biologically valuable coastal resources. (1989-90 Annual Report, p.22)

**Furlough Gulch Subdivision Conflict Resolution.** Prior to 1972, when coastal subdivisions were relatively unregulated, thousands of lots were created in areas inappropriate for development. Permanent protection of the coast required the Coastal Commission to temporarily deny such development. In the case of Furlough Gulch, a 38-lot subdivision on 22 acres planned for a parcel that flanks Sonoma Coast State Beach, the land was purchased by the Conservancy and resold to the Department of Parks and Recreation. The cost of acquisition was defrayed by transfer of development rights whereby developers on alternative sites paid fees for intensified development and these fees were used to reimburse the Conservancy. This made possible keeping land that should be in open space from being developed. (1982 Annual Report)

**Access to the Beach.** The Coastal Conservancy has funded stairways, wheel chair ramps, bike paths, gravel paths and other amenities to facilitate access to the beach and from the bluffs to

the shoreline. Although accessways have served to open up areas of the coast to human access, they have also served to guide pedestrian traffic over or away from fragile resources to the water's edge; and provide visual access through scenic vistas and coastal trails.

#### **CA-4 Local Coastal Program Implementation- Dunes Protection**

In California, local governments' adoption and implementation of Local Coastal Program (LCPs) vary depending, in part, on the type and extent of coastal resources, geologic conditions, hazard risks, and development pressures. Each LCP was required to adopt policies suitable for protecting coastal resources, such as beaches and dunes and natural land formations (bluffs/cliffs) consistent with the policies of the CC Act. Time did not permit completion of case example of dunes protection.

#### **CA-5 Local Coastal Program Implementation- Bluff Protection**

There are several examples of local bluff protection: Malibu, Marin County, Oceana Marin, Cayucos. Time did not permit completion of case examples. However some references noted below.

District Interpretive Guidelines- Malibu- Environmentally Sensitive Habitat Areas; Natural Landforms; Natural Hazards Waiver of Public Liability, Landslide Areas, Blufftop Development Shoreline Development - 10 ft setback, Stringline Bulkheads; Wave Hazards Residential Development- Small lot Subdivisions, Slope Intensity Formula

#### Interpretive Guidelines for Marin County

Bolinas- "Geologic studies indicate the new construction at Bolinas Mesa should have a minimum setback of 150 feet from the bluff."

Oceana Marin. Extreme geologic instability at Oceana Marin, ..as an interim measure, all permit applicants should be required to join the Bodega Bay Preserve and Bodega Bay Club to contribute to erosion prevention measures...."

Cayucos Guidelines-Oceanfront bluffs in Cayucos subject to erosion. Carefully follow Statewide Interpretive Guidelines on Geologic Stability on Blufftop Development

### **CONNECTICUT**

#### **CT-1 Victoria Beach Condominium Project**

#### **CT-2 CT-2 Harvey's Beach Acquisition**

#### **CT-1 Victoria Beach Condominium Project**

Various components of a proposal for a 40-unit condominium complex at Victoria Beach in East Haven have been reviewed by the municipal zoning board with substantial OLISP involvement since 1984. The original complex was proposed for location on a bluff immediately landward and east of an existing public beach area. This area is very dynamic and has experienced periodic storm-related erosion over the years, and also accretes and erodes sand seasonally. Because the project was proposed and constructed fairly soon after the passage of the Connecticut Coastal Management Act (CCMA), which went into effect on January 1, 1980, OLISP's early involvement was significant and centered on relevant CCMA consistency issues such as the protection of the beach resource through use of non-structural measures, including dunes, for shore stabilization along with the need for adequate building setbacks from the water. OLISP had also indicated during review of the project that since the condominiums at Victoria Beach did not exist as of the effective date of the CCMA, the use of structural solutions to flood and erosion problems, such as a seawall, would be in violation of Section 22a-92(b)(2)(J) of the CCMA which allows structural solutions to flood and erosion problems when necessary and unavoidable for the protection of infrastructural facilities, water-dependent uses, or existing inhabited structures, and where there is no feasible, less

environmentally damaging alternative and where all reasonable mitigation measures and techniques have been provided to minimize adverse environmental impacts. OLISP specifically recommended that non-structural alternatives including adequate beach nourishment, dune creation, and building setbacks be incorporated into any project plans for this property to protect against flooding or erosion. When the condo complex was subsequently approved, a dune was incorporated into the project plans while adequate water-side building setbacks were not required. The dune and vegetation planted early on, which has required periodic replenishment and replanting after significant storm events, has been effective for over 10 years in protecting the beach and dwellings in the area. However, pressures have periodically surfaced from residents to build a structural seawall to protect the condos, some of which lie within 10 feet of the top of the dune bluff. In 1996, residents again proposed to build a seawall approximately 260 long and ranging from 20 to 35 feet wide just landward of direct DEP regulatory jurisdiction. Such a structure, if locally approved, would have been inconsistent with the same CCMA policies and standards, and would have been unprecedented in terms of size in this area of Connecticut in recent years. Based on OLISP's historic and on-going coastal management involvement, the Planning and Zoning Commission denied the seawall application in July of 1996, instead recommending redesign, replenishing and replanting of the dune which has effectively protected the beach and condos since the mid 1980's.

#### **CT-2 Harvey's Beach Acquisition**

As a result of coastal management issues raised during the coastal site plan review of a proposed development project on Harvey's Beach in Old Saybrook, the town decided to purchase the popular swimming beach and preserve it for public use. "Coastal Management in Connecticut, Beyond the First Decade, p.8"

### **DELAWARE**

#### **DE-1 Delaware's Piping Plovers Management Plan**

#### **DE-2 Beach Nourishment Project at Dewey Beach**

#### **DE-1 Delaware's Piping Plovers Management Plan**

This plan will be a networked plan between the US Fish and Wildlife, Department of Natural Resources and Environmental Control, and the Soil and Water Conservation. The plan will be implemented by the Department of Natural Resources and Environmental Control. The plan will be in effect as long as the species is in need of state management, and the determination will be abased upon status of the species on official State or Federal Listings of threatened or endangered species. The management practice is to identify nests and monitor to determine when eggs are laid. During the nesting period, "permanent fencing" will be installed perpendicular to the dune, from the dune to the high tide line, on both sides of the piping plover nest. The fencing should be no closer than 300 feet of the nest, and specific location will be determined case by case. The fencing will be installed by the Staff of Soil and Water Conservation. There will be no construction of jetties, groins, bulkheads, or other "hard" coastal protection structures during the nesting period that would have detrimental effects.

#### **DE-2 Beach Nourishment Project at Dewey Beach**

In July of 1994, there was a \$2.3 million beach replenishment project in progress at Dewey Beach, Delaware. The project added more than a half million cubic yards of sand to Dewey Beach, whose shoreline had been damaged by coastal storms and has suffered tremendous erosion.. Sand was dredged from the ocean at a borrow site 2.5 miles offshore and pumped onto the beach. The state paid half of the 2.3 million dollar cost, and the Town of Dewey Beach paid the other 50%. Over time the town will be reimbursed with a portion of the funds raised by the state's accommodation tax.

### **FLORIDA**

**State Revises Beach Armoring Policies to Protect Sea Turtles.** The Florida Department of Environmental Protection (DEP) is changing its proposed beach armoring rules to protect sea

turtles. As a result of the revisions, the Center for Marine Conservation (CMC) and the Caribbean Conservation Corps (CCC) announced today that they have agreed to withdraw their challenge to the rules 15 days after publication of the changes. CMC and CCC filed a challenge to the rules in early June because the State's beach armoring policies failed to adequately protect threatened and endangered sea turtles that nest on Florida beaches.

"We are withdrawing our challenge because the DEP has taken an important first step by prohibiting the construction of harmful sea walls and other beach armoring devices on public lands in the Archie Carr National Wildlife Refuge. However, we will continue to fight to control all armoring within the Refuge that destroys sea turtle nesting sites and public beaches. There should be at least one safe place in Florida for sea turtle nesting," said Tim Eichenberg, Program Counsel for CMC. The Archie Carr Refuge is the most important nesting site for threatened and endangered loggerhead sea turtles in the western hemisphere, and the largest nesting site for endangered green sea turtles in the United States.

DEP also revised its rules to provide that the U.S. Fish and Wildlife Service (USFWS) should review local agency emergency armoring projects under the Endangered Species Act (ESA) to ensure the protection of sea turtles and nesting habitat. "The revisions will at least provide some oversight to ensure that emergency armoring projects do not sidestep the requirements of the ESA. The changes also mean that the DEP, USFWS and local agencies must be vigilant and, where possible, plan ahead to ensure that nesting beaches are not destroyed," said David Godfrey, Program Director with the Caribbean Conservation Corporation.

CMC and CCC will continue to press the State to honor its pledge to restrict all armoring within the Archie Carr Refuge, and comply with the requirements of the Florida Marine Turtle Protection Act and the ESA. Both laws prohibit the "take" of threatened and endangered sea turtles through "significant habitat modification or degradation" that impair nesting beaches. CMC and CCC were represented by the Sierra Club Legal Defense Fund.

The Center for Marine Conservation has over 120,000 members nationally, and approximately 8,000 in Florida. It is headquartered in Washington D.C., and has regional offices in St. Petersburg, California and Virginia. The Center is the nation's leading nonprofit organization dedicated solely to protecting the marine environment. The Caribbean Conservation Corporation is the oldest sea turtle conservation group in the world, founded in 1959 by Dr. Archie Carr for the sole purpose of studying and protecting marine turtles and their habitats. CCC is headquartered in Gainesville, Florida, with field offices in Tortuguero and San Jose, Costa Rica.

**CONTACTS:** Tim Eichenberg, Center for Marine Conservation (202) 429-5609 or David Godfrey, Caribbean Conservation Corp. (352) 373-6441; FAX:(352)375-2449; Sea Turtle Survival League, Caribbean Conservation Corporation; [ccc@cccturtle.org](mailto:ccc@cccturtle.org); \*\* New Web Page! <http://www.cccturtle.org>; Mailing Address: 4424 NW 13th Street, Ste A-1, Gainesville, FL 32609  
June 26, 1996

**Publications:** Beaches-The Official Journal of Florida's Shore and Beach Preservation Association; and The Coastal Barriers Resource Manual: Federal and State Program Highlights.

## **GUAM**

**Recreational Water Use Management Plan:** The Guam Coastal Management Program developed and adopted the Recreational Water Use Management Plan in 1990-1991. The plan covers a 6 miles stretch along the coast and in the water. It addresses user conflicts along this stretch of beach and water. Bird nesting areas are identified and protected, and Manahac fish-runs protected. The plan prohibits jet skis except in management plan areas. The plan provides for "use zones" for certain water activities in planned areas, and requires buoyed areas for jet-ski-type vehicles and mechanized vehicular closure during predictable Manahac runs. Minimum operating age is 16 years for all mechanized water vehicles. Jet skis can only be operated in planned areas-- two such areas have been adopted, and a third area being finalized. The first area planned, Agana Bay to Piti, encompasses 6 linear miles of coast to a distance varying from

two hundred yards to half a mile. The second area, Cocos Lagoon, is a triangular shaped lagoon 3 miles long on the land side, extending 2 miles seaward. The third area is Apra Harbor, which is Guam's commercial port, the Navy port and Guam's Harbor of Refuge.

## **MAINE**

### **ME-1 The Atlantic Condominiums at Old Orchard Beach**

#### **ME-2 Sand Dune Rule**

### **ME-3 Cutler Coast Acquisition and Management Plan**

#### **ME-4 Coastal Control Zone Regulations**

### **ME-1 The Atlantic Condominiums at Old Orchard Beach**

In 1987, the Maine Board of Environmental Protection denied a permit for the construction of the Atlantic Condominiums in Old Orchard Beach, Maine. The project would have contained 96 units, 8 story residential condominium, two 2-story parking garages, and a new frontal dune ridge between the land and the beach. This project was located along a beachfront with no existing seawall. The proposed building would have been about 137 feet from the shoreline. Experts disagreed on the amount of erosion and shoreline retreat to be expected, but consensus was that retreat will occur, and that the project as proposed would be in the intertidal zone in the next 100 years. Additional grounds for denial were based on applicant's inability to demonstrate that the project would not adversely impact the sand dune system; unreasonably interfere with existing recreational or wildlife use and natural supply or movement of sand; not increase erosion hazard or cause flood hazard to structures built on property or neighboring property. The applicant requested a reconsideration of the project with modifications to a 30 unit structure, no parking garages and located 286 feet from the shoreline and contested the shoreline retreat calculation over the next 100 years by state experts. The Board denied the reconsideration, citing that the applicant's change to the proposal constituted a substantially different project and should be considered as a new application. Market conditions changed and the applicant elected not to submit a new application request.

The debate centered around the calculation of shoreline change and retreat based on sea level rise, absence of a seawall and construction of a sand dune, the natural storage and movement of sand, and other data. Several geologists testified. Credibility over certified state geologists versus non-certified geologist became an issue. This case example illustrates the difficulty coastal states face in implementing setback laws based on shoreline erosion rates, given limited data on historical shoreline change and the effects of shoreline stabilizations and artificial dunes on impeding erosion. The Department of Conservation, Natural Resource Information and Mapping Center (formerly Maine Geological Survey) has been called upon by the DEP to assess natural hazard risks associated with building close to the shoreline. The Maine CZM Program is working on refining methods for determining erosion rates of the shoreline and applying these to the shoreland zoning setbacks.

### **ME-2 Sand Dune Rule**

The Maine Sand Dune Rules are very clear with regard to location of dune system and applicant requirements. There are maps of all beach/dune systems. This has made it very easy for applicants to comply with the requirements.

The Maine Sand Dune rule covers frontal dunes and back dunes and applies to the entire dune system whether developed or not. For example, the York, Maine beachfront is paved and seawalled with the highway running along it. However, it is classified as a "frontal dune" and subject to the same protection as undeveloped/pristine frontal dune areas. Recent State efforts to distinguish between developed and pristine dune areas has met with resistance from citizens opposed to changing the law. The state is facing a few takings cases involving the denial of variances for development on frontal dunes along the developed portion of York Beach. (Dan Prichard 207-287-7826)

### **ME-3 Cutler Coast Acquisition and Management Plan**

In 1989, the Land for Maine's Future Program acquired the 2,174 acre Cutler Coast Unit with 4.5 miles of ocean frontage in the Town of Cutler. The property contains steep bedrock cliffs jutting into the Atlantic Ocean, with the highest elevation 220 feet above sea level. The property also contains coves, pebble and cobble beaches. Through a 1993 Management Plan, 600 acres or twenty-seven percent of the property has been set-aside as a "special protection area" including 1500 feet from the seaward edge of the cliffs and where they occur pocket beaches from MHW. (Source: Cutler Coast Unit Management Plan, 1993)

#### **ME-4 Coastal Control Zone Regulations**

The Maine Coastal Program illustrates the complexity of regulating diverse resources- such as beaches, bluffs and rocky shores. Maine uses three coastal construction regulatory programs to protect its beach and dune system and natural resource areas. Under the Natural Resources Protection Act, coastal frontal sand dunes and back sand dunes are mapped and protected. The Maine sand dune rules apply equally to the entire dune system, whether developed or pristine areas. There is a de facto setback from frontal dunes. In back dunes, there is a size limit of 2,500 square feet, the structure must be moveable, and elevated above 3" sea level rise, with multifamily elevated higher. Reconstruction of structures damaged >50% is prohibited unless all new building standards are met, including minimal damage to dunes, lot restrictions, bird habitat protection, and revegetation of disturbed areas. Additions, may not expand floor area or volume by more than 30% of existing structure. Exceptions include maintenance and repair of existing structures, temporary structures, walkways, open decks smaller than 200 square feet, and underground storage tanks outside the V-zone. State permits are also required for activities within "protected natural resource areas" which include the 100-year flood zone, moderate/high value wetlands, and steep slopes greater than 20%. Development in "protected areas", with the exception of single family residential, must be set back 250 feet from NHWL. Under the Municipal Shoreland Zoning Act, state-mandated and locally-implemented setbacks required. 75-foot setback for residential and 25 ft for general development/commercial.

#### **MASSACHUSETTS**

##### **MA- Sylvia State Beach and State Highway on Martha's Vineyard**

Sylvia State Beach is a ~2.5 mile long barrier beach on the Island of Martha's Vineyard. It is owned by the Department of Environmental Management (DEM) and maintained by the Dukes County Commission. The beach is bordered on the East by Nantucket Sound and to the West by Sengekontacket Pond. There are two fixed inlets into the Ponds. Longshore sediment volume and transport to the state beach may be reduced and interrupted over the years through construction of a variety of coastal engineering structures northeast of the Pond and through channel construction and maintenance.

The controversy at Sylvia State Beach revolves around the beach road, a state highway which runs the entire length of the state beach. Erosion of the beach, particularly immediately downdrift of the last two stone groins, coupled with the Beach Road's low elevation relative to storm surge and waves, has resulted in storm damage and temporary closures after coastal storm events. Both the Massachusetts Highway Department (MHD) who maintains the road and the Towns want to protect the road as a link for emergency and other vehicles between Oak Bluffs and Edgartown.

Since the October Storm of 1991, state agencies have debated how to best protect long-term the road and the barrier beach system consistent with the Wetlands Protection Act and other regulations. In the interim, dune building, planting and beach nourishment efforts by the Friends of Sengekontacket Barrier Beach Task Force and MHD beach nourishment have protected the beach and road from major storm events.

The Massachusetts CZM Program have co-sponsored a series of meetings with other state agencies, local towns and conservation commissions, the county, harbor masters, universities, state legislators, and federal agencies. These meetings have resulted in an Interim Plan, short-term alternative to reduce storm damage to the beach Road. The Plan calls for construction of 1-3 adjustable wooden groins, beach nourishment, and dredging of Sengekontacket Pond to protect the roadway until a long-term erosion control measure and storm damage reduction is implemented.

## **MICHIGAN**

**Regulatory Controls:** The Michigan Coastal Program illustrates a multi-faceted program which has specialized regulatory controls for different types of areas. Under the Shorelands Protection and Management Act (SPMA), three types of areas are regulated: 1) high risk areas--subject to bluffline recession; 2) environmental areas--fish and wildlife habitat; and 3) flood risk areas--flood-prone areas due to changes in Great Lakes water level. The "high risks erosion areas" have been surveyed and designated. Included are all areas with erosion > 1 foot per year over 15 or more years. This area can extend inland from MHW as far as 1,000 feet from the bluffline. Setbacks are required and based on 30-year bluffline erosion projections. Within the setback area, new permanent structures are prohibited, and lakeward relocation of existing structures is prohibited. Existing structures in front of the setback line cannot be moved lakeward and any addition must be located landward of the setback line. Repairs to deteriorated or damaged structures >60% of building's replacement value must meet new setback standards. If less than 60%, structures can be restored to previous condition. Exceptions to the setback for small lots granted if waste handling system is landward of the structure, the structure is moveable and located as far landward as possible, and the building meets engineering standards. For structures in danger from erosion with access routes too narrow or steep to relocate the structure, shoreline stabilization permits may be granted, but only after all other options are exhausted and sewer and engineering standards are met. Major regulatory amendments in 1992 expand the definition of bluffline to include non-bluff areas subject to erosion. All "zone of imminent danger"--area landward of bluffline where erosion anticipated in the next 10 years--must be designated. An additional 15 feet was added to the setback to address severe short-term erosion or landslides or high water. Construction requirements were eased. Additions are allowed if existing building and addition are moveable, the addition and the foot-print does not exceed 25% of the building's foundation, and located landward of zone of imminent danger. Reconstruction of substantially damaged structures (60-100% of replacement value) is allowed if damage not caused by erosion and if structure is not reconstructed in zone of imminent danger and is readily moveable. Small structures (.3,500 square feet foundation and >5 units) must be moveable if built between setback and 2 times setback distance. For larger structures, the setback is doubled.

The Sand Dunes Protection Act of 1976, strengthened in 1989, protects critical dune areas within 2 miles of the Great Lakes, much farther inland than the 1,000 feet SMPA high risk erosion area jurisdiction. Regulations may extend inland 250 feet from a critical dune area. A 100-foot setback from the crest of the dune is required unless dune stability standards are met. Development, silvaculture and recreation affecting dunes and contour changes is regulated. Building is not allowed on slopes 25-33% without registered plan or slopes >33% without a special exception. Special use projects are regulated including industrial, commercial, multi-family >3 acres or >4 units per acre. Variances can be granted for rebuilding of nonconforming structures within critical dune areas if built prior to act and destroyed by fire or non-erosion forces or made nonconforming due to erosion.

## **NEW HAMPSHIRE**

**Public Land Management:** This example illustrates the diversity of public land management activities that occur in a coastal state with a small shoreline which is mainly in state ownership. New Hampshire has 9 state beachfront parks covering ~9 beachfront miles, and 7 rocky shore state park and other holdings along the Atlantic Ocean. In addition, there are several local beachfront parks covering over 2 beachfront miles. About 78% of the 18 mile long shoreline is in public ownership. The state has completed several state coastal park management plans including studies of archeological, historical, recreational, and natural resources. 20 natural resource inventories funded by CZM provide baseline data on habitat areas for permitting by Wetlands Board and are used for public education.

The 53 acres of the Seabrook Back Dunes were acquired by the Town of Seabrook with partial funding (\$100,000) from the CZM Program. The area was acquired for conservation and passive recreation and constituted the only major undeveloped back dunes remaining along the New Hampshire coast. CZM funded an Education Brochure Trail Guide to the Seabrook Dunes

Area (1985), Coastal Endangered Plant Inventory on Seabrook Dunes (1983), Seabrook Dune Management Plan (1985), Dunes Valuation Analysis and Acquisition Report 1984, and Final Appraisal (1986). A Fish and Game easement on a 4-5 acre dune spit at the mouth of Hampton River was also acquired as an endangered piping plover nesting site. If nesting occurs, the land may be fenced and foot traffic restricted during nesting season. The state also acquired lands adjacent to Odiome Point State Park, as well as other parcels, to expand their coastal land holdings for recreation and conservation. CZM funds were used to develop an Odiome State Park Management Plan.

New Hampshire has completed a multi-year Seabrook Foredunes Restoration Project on a 15 acre system on town-owned Seabrook Beach. The project involved restoring badly eroded dunes, the planting of American beach grass to stabilize the dunes, and the construction of walkways from the street to the beach to direct access and minimize adverse impacts on dunes. Signs along walkways inform the public about dunes restoration work and the importance of using walkways.

The coast is almost fully developed. Route 1-A borders the ocean along most of the coastline. The state periodically repairs and maintains protective seawalls running between the beach and the road, as well as seawalls protecting state beachfront parking lots. Two USACE- built harbor jetties are maintained. Periodic harbor channel dredging and placement of sand on beaches occurs. The jetty at Hampton Harbor Inlet is periodically repaired. Hampton Harbor is periodically dredged by the state and beach-quality sand placed on Hampton Beach. The USACE also periodically dredges the Hampton Harbor entrance channel, but the sand is not always used for beach nourishment.

## **NEW JERSEY**

### **NJ-1- CAFRA Amendments**

### **NJ-2- The New Jersey Beach Profile Network Program**

#### **NJ-1- CAFRA Amendments**

In 1970, New Jersey passed the Coastal Area Facility Review Act (CAFRA) which required that certain large facilities be subject to state review and permits. Only coastal area facilities with 25 or more housing units and commercial development with 300 or more parking spaces were required to obtain a development permits from the State DEP. AS a result of this loophole, an estimated 50% of the development in the coastal zone was taking place without State or NJCZMP review. In July 1993, New Jersey passed amendments to the CAFRA, closing a major loophole in the act. Now permits are required for any development on a beach or dune, or any residential development with 3 or more dwelling units within the CAFRA boundary. This amendment is intended to improve state oversight of development within the coastal zone. It will address coastal hazard management requirements and cumulative and secondary impacts of numerous small developments along the coast.

#### **NJ-2- The New Jersey Beach Profile Network Program**

Coastal damage along the New Jersey coast shore by a March 1984 northeast storm and the 1985 Hurricane Gloria brought to attention the lack of survey data needed to substantiate the severity of storm losses on state and municipal beaches and episodic verse long-term erosion. FEMA recommended an updated mapping program every five years or after severe storm events, complemented by a seasonal or annual beach-dune profiling program. In response, the New Jersey Beach Profile Network (NJBPN) was established in 1986 to collect and analyze data on shoreline and beach face conditions and erosion trends. The Stockton State College Research Center has received almost \$118,000 in CZM funds to create beach profile stations and annually monitor and map changes to beach-dune profiles. Data collected under this program continues to aid the regulatory and planning components of N.J.'s Coastal Management Program in determining areas of potential erosion problems, implementing policies and discussing permits to protect beaches, dunes, overwash fans and erosion hazard areas, as well as reducing development risks in high hazard areas, and improving coordination with FEMA after storm events.



## **NEW YORK**

### **NY-1: Westhampton Beach Erosion and Groinfield Chronology**

#### **NY-2: Coney Island Beach Nourishment Project**

### **NY-1: Westhampton Beach Erosion and Groinfield Chronology**

During a 1938 hurricane, Shinnecock Inlet opened increasing the erosion rate west of the inlet to over 6 feet per year in some locations. Emergency dune repair by State and local governments cost about \$180,000. In 1951, sand fill and beach grass was used to close a small inlet formed during a nor'easter. In the 1950's, the US Army Corps of Engineers (USACE) developed a protection plan calling for beach nourishment only. Local concerns resulted in plan modification to allow immediate construction of groins. In 1958, the Westhampton dune was nourishment with 380,000 cubic yards of sand. In 1960, the Federal Rivers and Harbors Act authorized the Atlantic Coast of Long Island, Fire Island Inlet to Montauk Point Beach Erosion Control and Hurricane Protection Project which was subsequently amended by 1974, 1986, and 1992 Water Resources Development Act. A March 1962 nor'easter caused severe erosion; a new inlet was formed which was closed with emergency placement of sand at a cost of around \$970,000. In 1963 the USACE and the NYS Superintendent of Public Works and the County agreed to construct a beach erosion control and hurricane protection project for the reach with 23 groins and fill placement. In 1965, eleven groins were built 480 feet long and 1200 feet apart with an elevation of 16 feet above MSL at the landward end and 2 feet above MSL at the seaward ends. No beach nourishment was provided. In 1969, an additional four groins were built in response to rapid erosion and 1.9 million cubic yards of sand was dredged from the bay and placed with the groins. The total cost for the 15 groins was about \$6 million. In 1973, property owners along Dune Road west of the groin field a class action suit against the U.S., State of NY and Suffolk County which is still pending.

In 1977, an interim project was proposed by the USACE at the Westhampton Beach. The project would add 4 million cubic yards of fill to existing groin compartments and 4 million cubic yards to nourish beach west of the groins, at a cost of \$50-75 million to be cost shared 70% federal, 21% state, and 9% county. Additional beach and dune nourishment for the remainder of the island and 8 groins was also proposed at \$55-80 million. Nor'easters caused severe erosion in 1978, 1984, and 1992. In 1983 sand was bulldozed to reopen Dune Road. In 1984 Dune Road was rebuilt and 125,000 cubic yards of sand was used create artificial dunes costing \$900,000. Litigation against Suffolk County claimed damages over \$70 million affecting 300 property owners as a result of the nuisance caused by the groins. The County in turn sued the US (USACE) and the State of New York.

In 1987 the NYS Department of States proposed an alternate project plan to address problems raised by the groin fields-- taper the existing groins and nourish the beach downdrift of the groins at a cost of \$25-50 million. A 1992 storm created two new inlets. In 1993, USACE rejected the NYS alternate project plan in favor of a 3-5 year study, but later agrees to proceed with NYS plan. USACE closes the new inlet for \$8 million. The cumulative impact of the groins, storms, and inlet migration resulted in the loss of about 200 private structures.

In 1994, affected area becomes Village of Westhampton Dunes and in 1995 lawsuit settled with Suffolk County paying Westhampton Dunes \$2 million in damages and up to \$2 million in legal fees. NYS-DEC places about 8,000 cubic yards of sand to maintain the inlet closure for \$54,400. In 1996, the USACE proceeds to implement the "modified state plan" to taper groin fields, adding fill to groin area and placing sand downdrift of groins. Estimated cost is \$30 million, plus \$7 million every 3 years for renourishment for 30 years. Project is ongoing at this time.

Source: NY Coastal Management Program -staff file.

### **NY-2: Coney Island Beach Nourishment Project**

New York's Coney Island beach has received beach nourishment, beginning in 1923. In the 1970s, the US Army Corps of Engineers (USACE) developed a beach erosion control and hurricane protection plan for the area involving beach restoration and terminal groins. Due to lack of support from non-federal participants, the large project proposed by the USACE was scaled back, but the 1986 Water Resources Development Act authorized federal participation in the larger beach restoration plan for Coney Island. After further reanalysis, a Final General

Design Memorandum was approved and funds appropriated in 1992. The project cost \$9.5 million with the New York State Department of Environmental Conservation (NYSDEC) paying 25%, the City of New York paying 10%, and the federal government paying 65%. Source: Emmett, Brian. K., Larry J. Cocchieri, and John R. Lesnik. "Coney Island Storm Damage Reduction Plan." *Shore and Beach*. Vol. 63, No. 4, October 1995, pps.5-10

#### **NORTH CAROLINA**

**Oceanfront Setback Program:** The North Carolina Coastal Area Management Act is an example of a strong oceanfront setback law which uses erosion rate based setbacks which vary by type/size of structure. Areas of Environmental Concern (AECs) are designated and regulated based on state standards. "Major development" -drilling or activity occupying >60,000 square feet of land--requires a state permit. Smaller projects require local permits. Within the "Ocean hazard AEC"-- sand dunes, ocean beaches, and other areas exhibiting substantial possibility of excessive erosion-- coastal goals include: 1) minimize loss of life and property from storms and long-term erosion; 2) prevent encroachment of permanent structures on public beaches; and 3) reduce public costs resulting from inappropriate coastal development. Regulations cover 3 areas: 1) ocean erodible areas, 2) high hazard flood areas; and 3) inlet hazard areas. A statewide oceanfront setback is required within the ocean hazard areas based on average annual erosion rates, natural site features, and the nature of the proposed development. The setback is measured from the first line of stable natural vegetation or aerial photos/ground survey where no stable vegetation. New structures smaller than 5,000 square feet and fewer than 5 residential units must be set back the farthest landward of the following: 1) a distance equal to 30 times the long-term annual erosion rate; 2) the crest of the primary dune; 3) the landward toe of the frontal dune, or; 4) 60 feet landward of the vegetation line. Larger structures must be set back 60 times the average annual erosion rate or 120 feet landward of the vegetation line. Where erosion rates exceed 3.5 feet per year, the setback line for larger structures is set at 30 times the erosion rate plus 105 feet. The law was passed in 1974, made part of the coastal program in 1978, and amended in 1981 to allow single-family residences on pre-existing lots not deep enough to meet the erosion setback requirements, as long as they are set back at least 60 feet. The coastal program has focus attention on studying erosion rates used in determining setbacks.

#### **OREGON**

**OR-1 Oceanfront Improvement Permit Implementation**

**OR-2 Local Setbacks**

**OR-3 Sea Cliff Land Slides, Geologic Hazards Management**

**OR-4 Oregon Territorial Sea Plan and Rocky Shores Strategy**

#### **OR-1 Oceanfront Improvement Permit Implementation**

The Oregon Department of Parks and Recreation (OPRD) regulates new shoreline stabilization structures within "ocean shore recreation area" under Oceanfront Improvement Act. All beachfront erosion control devices must be built as far landward as possible to prevent encroachment on the public beach. State Goal 18 prohibits erosion repair permits on lots where there were no physical improvements ( i.e., buildings, roads, water lines and sewer lines) existed on oceanfront lots platted before January 1, 1977. State Goal 17 promotes nonstructural solutions to erosion problems and calls for erosion stabilization structures to be designed to minimize adverse impacts on water currents, erosion and accretion patterns. The law allows emergency permit for a new improvement, dike, revetment, or for repair, replacement or restoration of an existing, or authorized improvement where property or property boundaries are in imminent peril of being destroyed or damaged by actions of the Pacific Ocean or the waters of any bay.

The ground for denial of permits are very comprehensive and cover project need, public rights, public laws and compliance with state goals (scenic/visual impacts; beach access, impacts on adjacent properties and safety concerns, long-term public costs; and other resource concerns); project modification options; and public and agency comments.

A 1993 application to construct a 100 foot-long riprap revetment on the ocean shore in Lincoln County was denied by the OPRD. The grounds for denial included: 1) no habitable structure on the property; 2) property buildable without a beach protection structure; 3) inadequate documentation by the applicant of active erosion or cause of erosion on the site or impacts on adjacent properties; 4) public rights would be eliminated without justification on 800 square feet of public beach easement; 5) although local government defers to state regulations and state goals, Lincoln county code requires that "shoreline stabilizations be confined to areas where active erosion is occurring which threatens existing uses of structures" and "permitted only where a higher priority method is not feasible" and "designed and located so as to minimize impacts on aquatic life and habitat, circulation and flushing characteristics and patterns of erosion and accretion;" 6) nonstructural alternatives to the proposed revetment were not considered; 7) proposed revetment does not comply with county plan or state goals 17 and 18; and 8) adverse impacts and cumulative effects have not been considered.

The permit denial contained several nonstructural alternatives to avoid erosion hazards through site design and building setbacks; relocation of septic system which may be contributing to shoreline instability by saturating soil; shoreline reconfiguration and vegetative stabilizations; or use of dynamic or soft structures. The denial also noted that reduction on size of structural alternative or modified toe protection which would offer equivalent erosion protection and no encroach west of beach zone line.

This application was resubmitted and approved after the following amendments and new information was submitted: size of structure reduced; analysis of the effectiveness of alternative methods presented; analysis of possible adverse impacts to adjoining properties.  
(Source: Application BA-352-92, SP 3357 - Riprap Revetment NW Willa St. in Yachats, Oregon)

#### **OR-2 Local Setbacks**

Tillamook County, predominantly sandy beaches and dunes, has a construction setback in oceanfront and geologic hazard areas. The oceanfront setback line (OSL) is a line landward of the crest of the active foredune and approximately parallel to the State's BZL. Variances to the setback may be granted, but the setback must be at least 10 feet from the OSL. The oceanfront setback is based on existing structures and type of zone. In zones suitable for development, or already developed area, setback is determined by distance from dune crest possible to obtain ocean view from ground floor of proposed structure, the lot size, and the location of the seaward location of the nearest buildings within 250 feet of the proposed project. If there are not pre-existing structures in area zoned for development, oceanfront setback based on geological stability of site, landward crest of the foredune, and ability to achieve ocean view. In areas of active erosion or flood zone, the setback may be increased based on a site investigation and a geologic hazard report. In permitting shoreline stabilizations, in addition to demonstrated need, county priorities are: 1) maintenance of riparian vegetation; 2) vegetated riprap; 3) non-vegetated riprap; 4) groins, bulkheads, other structural devices.

Lincoln County, characterized by sandy beaches backed by sedimentary cliffs located between rocky headlands, uses setback requirements based on the erosion rate and the height of the bank at a given site. (The setback ranges from 1 ft setback per 1 ft of bank height to 2.75 ft setback per 1 ft of bank height.) Geotechnical reports and design modifications in areas of known hazards may also be required if the applicant proposes modifications to the setback requirements. This commonly occurs, since existing lots subdivided prior to the county setback law are too small to meet the setbacks. In permitting shoreline stabilizations, preference is given to 1) vegetative/nonstructural measures; 2) vegetated riprap; 3) unvegetated riprap; and 4) seawalls/bulkheads.

In Curry County, characterized by sea cliffs and rocky headlands with beaches, development decisions are on a case-by-case basis with a required geologic/engineering analysis. The diversity of the terrain precludes uniform requirements. The county allows shoreline protective structures if a property is threatened and there is a demonstrated need.

The City of Newport, like Lincoln County, requires setbacks based on coastal recession rates and bank heights for ocean bluff developments. Newport has setback regulations for geological hazard areas which increases the setback based on three erosion categories which increase with erosion rates ranging from 1 ft to 2.75 ft. per year. The City of Gearhart has mapped a Dune

Hazard Line based on rate of erosion and anticipated life of the structure. The City of Florence prohibits buildings within 100 feet of the leading edge of the foredune and no grading or breaching of a foredune. Shoreline stabilizations are allowed under a conditional use permit or by administrative review. In Waldport, if oceanfront and bayfront setbacks cannot be met, a geotechnical site report is required before a building permit can be issued.

### **OR-3 Jump-Off Joe Sea Cliff Land Slide- Geologic Hazards Management**

The erosion of sea cliffs is a significant problem along many of the world's coastlines, including Oregon. However, few studies document the processes and patterns of sea cliff retreat due to the complexity of multiple casual factors. Research confirms that sea-cliff erosion is highly variable along the Oregon coast. Landsliding has been a problem at some locations, particularly where development has occurred along bluffs composed of small remnants of marine terraces which are muddy and particularly susceptible to landsliding.

In 1942, a large landslide developed in the bluff at Newport carrying more than a dozen homes to their destruction. In 1982 a condominium was built on a small remnant of the bluff adjacent to the major slide, despite continued slumping in the area. Within three years, slope retreat had caused the foundation to fail and the unfinished structure had to be destroyed by the City of Newport. The City had allowed the condominium to be built on this known hazard area because a registered geologist, hired by the developer, submitted a geotechnical report attesting to the safety of the project.

Homes and condominiums are being built atop cliffs overlooking the ocean, as close to cliff edges as geologist evaluations will allow. Local governments in Oregon lack technical ability to evaluate geotechnical reports and have adopted few site evaluation standards which would ensure hazards avoidance from erosion or landslides. As a result, individual development in hazard areas are routinely approved. The erosion of sea cliffs along the Oregon coast has increased in prominence as a management issue. The Oregon Coastal Program is now focusing attention on improving state technical assistance and local government regulations in this area through development of hazard mitigation requirements, construction setback methodology, and area-wide hazard management plans.

### **OR-4 Oregon Territorial Sea Plan and Rocky Shores Strategy**

In 1992 the Oregon Ocean Plan was adopted. This was followed in 1994 with adoption of the Territorial Sea Management Plan which covers rocky shores, intertidal areas and ocean resources in an ecosystem management process. The Plan provides an ocean policy framework with management standards to be used in managing the marine resources in Oregon's territorial seas.

The Plan includes a Rocky Shores Strategy to protect Oregon's rocky marine habitats while providing people the opportunity to use them. Under the strategy, four classifications of rocky shores are designated to guide agency programs on the ground: They include: 10 "habitat refuges" along 4% of the rocky shore where access is limited; 7 "research reserves" along 7% of the rocky shore where access is discouraged and harvest is limited; 8 "marine gardens" along 10% of the rocky shore which encourage visitors to highly popular areas; and 29 "marine shores" along 79% of the rocky shore which are small areas which are open to public but not heavily used. In addition, 9 areas have been identified but not yet designated and 7 priority offshore rocks/reefs identified for future study.

A key aspect is local site management plans for rocky shore sites with mandatory policies to address complex site conditions, biological resources, human uses, and agency management concerns. Due to multi-agency management, the strategy provides clear policies for all agencies to follow and a process for intergovernmental coordination. Education and public awareness through communications and interpretive programs is a crucial part of the strategy to manage growing usage and impacts on rocky-shore areas. The strategy is based on sound research and monitoring. An extensive inventory and analysis of rocky shore sites along the coast was conducted in 1993-1994. This inventory provides the coastwide ecosystem context for site-by-site management. The detailed inventory of the Oregon rocky shores was conducted using aerial photos registered on the 7.5' base map. This data showed 161 miles of rocky shore and 395 miles of ocean coastline. Even these figures do not account for the vertical zone of certain large

rocks, such as haystack rock which has a vertical zone of 10 feet or greater around the base circumference and therefore a large intertidal surface area. In contrast, more generalized and straight-line state parks shoreline data shows 100.1 miles or 28% of the 361.9 mile-long coastline in rocky shores. (Peter Bond and Nan Evans, Oregon State Parks and Recreation Department, Table on Ocean Shoreline Ownership.)

The plan covers all rocky shores defined as shoreline features of rocky cliffs, rocky intertidal areas with associated rocks; and offshore features of rocks, islands, and submerged reefs within Oregon's Territorial Sea (ocean and seafloor area from mean low water seaward three nautical miles). This extremely comprehensive and ambitious plan covers marine fish and shellfish, invertebrates, marine plants, threatened and endangered species, migratory species, marine mammals, and all human uses (both recreational and commercial) associated with marine life and their habitat.

Illustrations of on-the-ground results of site management plans: 1) Four Marine Gardens have been closed to taking of marine invertebrates, clams (except razor clams at cape Perpetua), and mussel (except single mussels for bait). 2) Pyramid Rock in Rogue Reef, a critical habitat site for Steller sea lions and under increased fishery use, under the plan is closed within 1,000 feet to all fishing activity from May-August. Permit or management conditions have been placed on all rocky shore sites to protect the natural resource values of these areas.

## **PENNSYLVANIA**

### **Pennsylvania Bluff Recession and Setback Law and Coastal Hazards Area Technical Assistance Program to Lake Erie Property Owners:**

Pennsylvania's Bluff Recession and Setback Act provides a long-term, regulatory approach to reducing property losses from bluff recession along Lake Erie. The act requires municipalities in bluff recession hazard areas to develop, adopt and administer bluff setback ordinances. The ordinances restrict new development from bluff areas and limit improvements to existing structures within the minimum bluff setback distance. Setback distance is based on the rate of erosion (feet per year) multiplied by the life span of the structure. Life span for residential development is 50 years; commercial is 75 years; and industrial is 100 years; or at least 50 feet from the crest of the bluff. Currently, the act restricts development only from the bluff crest landward. CZM wants to strengthen the law by including the regulation of structures placed landward of the bluff crest in a high hazard area known as the bluff face. CZM is also working to improve its bluff recession monitoring techniques. The major effective of this program has been to keep new development a safe distance from bluff recession hazard areas.

Since 1981, CZM has provided free site analysis and recommendation service to Lake Erie property owners affected by shoreline erosion and bluff recession. The service consists of on-site inspections and recommendations on surface and groundwater control, bluff stabilization and the role of vegetation to stabilize loose soil conditions. In the first seven years of the service (1981-1988), approximately 3/4 of the surveyed property owners followed CZM's recommendations, resulting in an estimated property damage savings and property value enhancement of \$5.2 million. Pennsylvania is the only Great Lakes state to offer this service.

## **PUERTO RICO**

**Island Regulations:** The Puerto Rico Coastal Program is characteristic of state CZM programs adopted by the island states, territories and commonwealths where regulations are island-wide. Puerto Rico regulates development through island-wide land use policies and zoning districts. In addition to three shoreline setback areas, permits are required for activities within 1000 meters of the shoreline or farther inland to include important natural resources, as well as all offshore islands. There are 14 zoning districts within which specific activities are allowed. For example, no subdivisions are allowed in the following three Districts: Conservation of Resources District (CR); Conservation and Restoration of Resources District (CRR); and Resource Preservation District (PR). Exceptions granted in CR District for tourist-related recreation if the public interest and natural environment not adversely affected. In the Public Beaches District (PP), subdivisions and development allowed for hotel/vacation facilities, tourist villas, restaurants, recreation, wharves, docks and other water-dependent or water-related activities. Puerto Rico

also required Flood Areas permits for activities in Floodprone zones. In Zone 1 (floodways) development and major renovations are prohibited. Exception-existing structures cannot be expanded unless protected. Zone 1M(v-Zone) and Zone 2 (low areas) allows new development and modifications to existing subject to design/building requirements. There is also a relocation program in coastal high hazard flood areas. Effective beginning in 1992, there is a Maritime Control Zone and required state Authorizations and Concessions for nonconforming uses in the maritime zone- mapped territorial waters, submerged lands, inland to reaches of low lands beneath by ebb/flow of tides.

## **RHODE ISLAND**

**Coastal Construction Control over Coastal Features:** The Rhode Island Coastal Program is an example of a strong regulatory program with defined criteria addressing identified resources, activities, and management issue areas. The Coastal Resource Management Council regulates activities within and 200 feet landward of defined coastal features--coastal beaches and dunes, barrier beaches, bluffs, cliffs and banks, rocky shores, and manmade shoreline. Complex coastal zoning designates what types of activities are permissible on shoreline features, tied to 6 state water classifications. About 75% of the shoreline is adjacent to Type 1 Waters (Conservation) or Type 2 Waters (Low Intensity Use Areas) where alteration or construction of shoreline features and undeveloped barrier beaches is prohibited. In addition, activities are regulated by different setbacks from beaches and dunes, critical erosion areas, and coastal buffer zones. There are also regulations for specific types of activities (such as dredging, filling, new residential structures) as well as 17 designated coastal hazard areas and 18 identified erosion-prone areas. On barrier beaches, all residential and non-water dependent structures on dunes destroyed >50% may not be reconstructed regardless of insurance carrier coverage. Additions are allowed only to structures designated priority permissible uses.

## **SOUTH CAROLINA**

### **SC-1 Evolution of the Coastal Retreat Policy**

### **SC-2 Charleston Harbor Jetties and Folly Beach Erosion Problems**

### **SC-3 Simplified Permit Application Process**

#### **SC-1 Evolution of the Coastal Retreat Policy**

Until 1987, the SCCC routinely issued permits for erosion control structures on the beach. Construction allowed by the regulations resulted in a proliferation of sea walls and resultant acceleration of erosion of the beach by lowering of the beach face in front of the walls. Damages from the 1988 winter storms caused the Council to toughen its standards concerning permits for erosion control structures. The 1988 Beachfront Management Act and the 1990 Amendments established an erosion retreat program which requires the SCCC to develop setback lines derived from expected beach erosion over 40 years.

To build public awareness and education about the beachfront coastal erosion problems, the SCCC produced "Who Owns the Beach?", a 90 minute film on beach and hazard management issues which was aired in 1989. The SCCC has used mass media to communicate/respond to heightened public awareness of SCCC events such as the Lucas property taking case that received national press coverage as it made its way to the US Supreme Court.

State-of-the art scientific and technical expertise has been and continues to be used to refine the methodologies on which the state bases its shoreline construction retreat policy. This includes methodologies to protect structures from shoreline erosion and damage from storms.

Beachfront development prior to 1977 (the year that the State CZM statute was enacted) and from 1977 to 1988 (the year that the State Beachfront Management Act was enacted) resulted in a steadily increasing loss of the State's public beach resources. No better example of this trend exists than the development of the Garden City areas in Horry County. This unincorporated beachfront community in Horry County developed from 1977 till 1985 from single family beach cottages to high rise hotels and condominiums at the water's edge. In each case, the buildings and swimming pools occupy the entire square footage of the beachfront lots behind seawalls and revetments that leave little or no dry sand beach for much of the day. This development has

taken place since the State CZM program was enacted in 1977. This law provided little consideration for the protection and conservation of the public beach or for the dynamics of the changing beachface from erosion and storms. The proliferation of hard erosion control structures in this area has significantly narrowed the beach and flattened the beach profile resulting in a much less appealing tourist destination when compared to other areas with healthier beaches. The storm hazard potential has also been greatly heightened. The policy of retreat established in the 1988 legislation will require decades to correct this problem while repeated, expensive attempts at beach renourishment will be required in the short run to rebuild public beach. (Source: Chris Brooks)

#### **SC-2 Charleston Harbor Jetties and Folly Beach Erosion Problems**

Jetties constructed in the 1890s leading to Charleston Harbor and maintained by the US Army Corps of Engineers (COE) have a long recorded history of causing beach erosion on Folly Beach. Between 1988 and 1992, the SCCC worked with its Congressional Delegation to negotiate a management response with the COE to address this problem. The SCCC was successful in getting the Section 111 Study which documented the contribution of COE maintained jetties and the inlet to the Folly erosion problem. The COE has subsequently nourished Folly beach, paying for 85% of the cost with the state paying 15% at \$2.3 million.

**SC-3 Simplified Permit Application Process .** South Carolina DHEC in 1995 produced a brochure on "General Guide to Environmental Permitting in South Carolina". In cases where a 401 water quality certification and a direct state permit and coastal zone management consistency certification are required, the three are combined into a "state certification" or "state permit." The state certification is issued by EQC; however, all EQC and OCRM requirements for certification must be met (p.65). This constitutes a simplified joint permitting program between EPA and two state agencies.

## **APPENDIX E: BIBLIOGRAPHY**

### **BIBLIOGRAPHY FOR BEACHES AND DUNES, BLUFFS AND ROCKY SHORES**

In 1995, the National Oceanic and Atmospheric Administration Offices of Sea Grant and Ocean and Coastal Resources Management selected a team from the University of Washington, University of Rhode Island, Oregon State University, and Coastal Consultants to conduct the National Coastal Zone Management (CZM)

Effectiveness Study. The purpose of the study is to determine the effectiveness of the national CZM program, as developed and implemented by the states, in addressing certain core objectives of the CZMA. One of these core objectives for state programs is the "*protection of natural beaches, dunes, bluffs and rocky shores.*"

The National CZM Effectiveness Study is unique among CZM evaluations at the national level in that it seeks to determine on-the-ground outcomes of state CZM policy implementation. In the process of addressing estuary and coastal wetland protection issues and outcomes in the states, the investigators gathered a great deal of information, some published and others in the "gray literature."

As an independent task, OCRM has asked the investigators to compile a comprehensive bibliography of materials collected in the study at the national level and for each state. This bibliography is that product.

This bibliography is based on materials collected by members of the project research team consisting of Tina Bernd-Cohen, coastal consultant in Helena, Montana and Melissa Gordon, PhD. Student at Louisiana State University.

#### **NATIONAL**

Beatley, Timothy, David J. Brower, and Anna K. Schwab. 1994. *An Introduction to Coastal Zone Management*. Washington, DC: Island Press

Bernd-Cohen, Tina and Pam Pogue, Virginia Lee and Richard Delaney, 1995. "A Review of the 309 Coastal States Enhancement Grants Program". *Coastal Management*, Vol.23

Brower, David J., et al. 1991. *Evaluation of the National Coastal Zone Management Program*. Newport, Oregon: National Coastal Resources Research and Development Institute, NCRI-W-91-003.

Coast Alliance. 1995. *State of the Coasts*. Washington, DC.

Coast Alliance. 1995. *Health Coasts, Healthy Economy*. Washington, DC.

Coastal Ocean Policy Roundtable (COPR). *The 1992 Coastal Status Report: A Pilot Study of the U.S. Coastal Zone and its Resources*. Newark, Del.: University of Delaware, Center for the Study of Marine Policy.

Coastal States Organization (CSO). 1981. *Coastal Management Options for the '80: Final Report*. Washington, DC.

Coastal States Organization (CSO). 1985. *America's Coast: Progress and Promise*. Washington, DC.



Commission on Marine Science, Engineering and Development, 1969. *"Our Nation and the Sea."* Washington, DC.: US Government Printing Office

Englander, Ernie, James Feldmann and Marc Hershman, 1977. "Coastal Zone Problems: A Basis for Evaluation." *Coastal Zone Management Journal*, Vol. 3, p.217

Englander, Ernie, Jim Feldmann and Marc Hershman. 1976. *"Formulating criteria for evaluating coastal management problems"*. University of Washington, Institute for Marine Studies.

General Accounting Office. 1975. *National Efforts to Preserve the Nation's Beaches and Shorelines- A Continuing Problem*. RED-75-364. Washington, DC.: General Accounting Office.

\_\_\_\_\_. 1988. *Flood Insurance Statistics of the NFIP*. Washington, DC.: General Accounting Office.

Good, James W. 1992. *"Ocean Shore Protection Policy and Practices in Oregon: An Evaluation of Implementation Success"*. Corvallis, OR. (A PHD Thesis for Oregon State University.)

Kaufman, W., and O.H. Pilkey, Jr. 1983. *The Beaches are Moving: The Drowning of America's Shoreline*. Durham, North Carolina: Duke University Press.

Ketchum, Bostwick, ed., 1972. *The Water's Edge: Critical Problems of the Coastal Zone*. Cambridge: Mass. Institute of Technology.

Knecht, Robert W., Biliana Cicin-Sain and Gregory W. Fisk, 1995. "Perceptions of the Performance of State Coastal Zone Management Programs in the United States". Manuscript submitted to *Coastal Management Journal* for review, 30 pp.

Lipton, Douglas W., Katherine Wellman, Isobel C. Sheifer and Rodney F. Weiher. 1995. *Economic Valuation of Natural Resources--A Handbook for Coastal Resource Policymakers*. National Oceanic and Atmospheric Administration, Coastal Ocean Program Decision Analysis Series No. 5. NOAA Coastal Ocean Office, Silver Springs, MD. 131 pp.

National Committee on Property Insurance. 1988. *America's Vanishing Coastline: A New Concern For the Voluntary and Residual Property Insurance Markets*. Institute for Property Loss Reduction. Boston, Massachusetts.

National Research Council. 1995. *Beach Nourishment and Protection*. Washington, DC.: National Academy Press.

\_\_\_\_\_. 1990. *Managing Coastal Erosion*. Washington, DC.: National Academy Press

NOAA, DOC. 1981. *The Federal Coastal Programs Review: A Report to the President*.

Office of Coastal Zone Management. (OCZM)

1976. *State Coastal Zone Management Activities 1975-1976*.

1976. *Report to Congress on Coastal Zone Management, FY96*

1979. *The First Five Years of Coastal Zone Management: AN Initial Assessment*

1982. *Managing the National's Coast: Biennial Report to the Congress on Coastal Zone Management for Fiscal Years 1980 and 1981*.

Office of Ocean and Coastal Resource Management (OCRM)

1984. *Biennial Report- FY'82-'83*

1990. *Biennial Report- FY'88-'89*

1994. *Biennial Report- FY'92-'93*

1988. *Coastal Management: Solutions to our Nation's Coastal Problems*. Technical Assistance Bulletin. 101

1990b *Coastal Management Solutions to Natural Hazards*, TA Bull. 103

National Ocean Service, NOAA. 1992. *Building Along America's Coasts: 20 Years of Building Permits 1970-1989*.

Office of Ocean Resources Conservation and Assessment, NOS, NOAA. 1990. *50 Years of Population Change Along the Nation's Coasts: 1960-2010*.

Owens, David W. 1992. "National Goals, State Flexibility and Accountability in Coastal Zone Management". *Coastal Management*, Vol. 20, p.143.

Platt, R.H. et al. 1987. *Cities on the Beach: Management Issues of Developed Coastal Barriers*. Research Paper 224. Chicago: University of Chicago Press.

Platt, Rutherford H; Miller H.C., Beatley T., Melville J., Mathenia, B.G. 1992. Coastal Erosion: Has Retreat Sounded? Program on Environment and Behavior Monograph No. 53. Institute of Behavioral Science, University of Colorado., Chapter 3 pp. 46-55

Pogue, Pamela, Tina Bernd-Cohen, Virginia Lee, et al. , 1994. *A Review of the CZMA Section 309 Enhancement Grants Program: Executive Summary*. Report for NOAA, Office of Ocean and Coastal Resource Management. University of Rhode Island Coastal Resources Center/Sea Gant, p.19.

Pogue, Pamela, Tina Bernd-Cohen, Virginia Lee, et al. , 1994. *A Review of the CZMA Section 309 Enhancement Grants Program: State and Territory Profiles*. Report for NOAA, Office of Ocean and Coastal Resource Management. University of Rhode Island Coastal Resources Center/Sea Gant, p.272.

Powell, Scott L. and Marc Hershman, 1991. *Contribution of State CZM Programs to Improved Coastal Water Quality*. National Coastal Resources Research and Development Institute Report, NCRI-T-91-012.

Putt, A.D. and J.F. Springer. 1989. *Policy Research: concepts, methods, and applications*. Englewood Cliffs NJ: Prentice Hall.

Ringold, Paul L. and John Clark. 1980. *The Coastal Almanac for 1980- The Year of the Coast*. The Conservation Foundation, Washington, DC.: W.H. Freeman and Company, San Francisco, California.

U.S. Army Corps of Engineers. 1994. *Shoreline Protection and beach Erosion Control Phase I: Cost Comparison of Shoreline Protection projects of the U.S. Army Corps of Engineers*. Institute of Water Resources. Washington, DC.

\_\_\_\_\_. 1971. *Report on the National Shoreline Study*. Department of the Army Corps of Engineers. Washington, DC.

\_\_\_\_\_. 1995. Data from unpublished report on Section 309 Study. Department of the Army Corps of Engineers. Washington, DC.

U.S. General Accounting Office (U.S. GAO). 1990. *Problems Continuing in the Federal Management of the Coastal Zone Management Program*. Washington, DC: U.S. General Accounting Office.

U.S. General Accounting Office (U.S. GAO). 1986. *Resource Management: Information on the Coastal Zone Management Program*. Washington, DC: U.S. General Accounting Office.

Urban Institute. 1994. *Measuring Progress of Estuary Programs: A Manual*. U.S. Environmental Protection Agency, Office of Water, EPA 842-B-94-008, Washington, DC.

Wholey, Joseph, Harry Hatry, and Katherine Newcomber. 1995. *The Handbook of Practical Program Evaluation*. Josey-Bass Publishers.

## **STATES**

### **ALASKA**

Alaska Administrative Code January 1992. Title 11. Natural Resources. Office of the Commissioner, Parks, Recreation, and Public Use. Alaska State Parks - Statutes. October 1988.

Alaska Department of Natural Resources. Title 5, 9, 18, 38, & 41. The Constitution of the State of Alaska. Article VIII. Natural Resources. Alaska Department of Natural Resources.

Ringold, Paul L. and John Clark. 1980. *The Coastal Almanac for 1980 - The Year of the Coast*. W.H. Freeman and Company. San Francisco.

State of Alaska. 309 Assessment. State of Alaska. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. *A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010*.

US Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Alaska Coastal Zone Management Program and Final Environmental Impact Statement. 1979.

### **AMERICAN SAMOA**

American Samoa Government. Economic Development and Planning Office. 1994. American Samoa Coastal Management Program Administrative Rules.

\_\_\_\_\_. 1980. American Samoa Coastal Management Program and Final Environmental Impact Statement.

\_\_\_\_\_. 1992. Assessment of the American Samoa Coastal Management Program.

\_\_\_\_\_. 1996. MEMO from Geneveive Brighthouse-Failauga.

\_\_\_\_\_. 1992. Strategy American Samoa Coastal Management Enhancement Program.

U.S. Army Corps of Engineers. Pacific Division. 1994. American Samoa Shoreline Inventory Update II.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1980. American Samoa Coastal Management Program and Final Environmental Impact Statement.

## **CALIFORNIA**

City of Long Beach. 1980. Local Coastal Permit Procedures Ordinance.

Griggs, Gary B., James E. Pepper, and Martha E. Jordan. 1991. California's Coastal Hazards Policies: A Critique. The California Coastal Zone Experience, ASCE.

National Research Council. 1990. Managing Coastal Erosion. National Academy Press, Washington, D.C., Chapter 5, pp.109-117

State of California. California Coastal Commission. 1996. Administrative Rules.

\_\_\_\_\_. 1994. California Coastal Act of 1976 As of January 1996.

\_\_\_\_\_. 1992. The California Coastal Commission's Enhancement Grants Strategy ( 309 Strategy.)

\_\_\_\_\_. 1987. California Coastal Resources Guide. University of California Press.

\_\_\_\_\_. 1981. District Interpretive Guidelines: South Coast District: Malibu- Santa Monica Mountains.

\_\_\_\_\_. 1992. Final Assessment of the California Coastal Management Program performed Under Section 309.

\_\_\_\_\_. 1994. Land Form Alteration Policy Guidance.

\_\_\_\_\_. 1995. Local Coastal Planning Program Annual Report FY 1994-1995

\_\_\_\_\_. 1979. Local Coastal Program Manual (1977 and revised 1979)

\_\_\_\_\_. 1977. Local Coastal Program Regulations.

\_\_\_\_\_. 1993. Local Coastal Program Overview of Hazards and Shoreline Development.

\_\_\_\_\_. 1996. MEMO: Mitigation for Impacts of Seawalls on Sand Supply Coastal Development Permit Condition and Findings of Support with Methodology and Graphics.

\_\_\_\_\_. 1996. Memorandum of Agreement- Beach Sand Mitigation Funds.

\_\_\_\_\_. 1996. Memorandum of Agreement Between San Diego Association of Governments (SANDAG) and the Californian Coastal Commission Establishing a Process for the Administration of the beach Sand Mitigation Fund.

\_\_\_\_\_. 1994. ReCAP Pilot Project: Executive Summary: Preliminary Findings and Recommendations: Monterey Bay Region.

\_\_\_\_\_. 1995. ReCAP Pilot Project: Findings and Recommendations: Monterey Bay Region.

\_\_\_\_\_. 1979. Regional Interpretive Guidelines: Central Coast Region: Santa Cruz and Monterey Counties.

\_\_\_\_\_. 1980. Regional Interpretive Guidelines: South Coast Region: Los Angeles County.

\_\_\_\_\_. 1978. Regional Interpretive Guidelines: North Central Coast Region: Sonoma, Marin, San Francisco Counties.

\_\_\_\_\_. 1978. Regional Interpretive Guidelines: South Central Coast Region.

\_\_\_\_\_. 1980. Regional Interpretive Guidelines: South Coast Region: Orange County.

\_\_\_\_\_. 1990. Report to the City of Sand City on the Implementation of its Local Coastal Program: Draft Staff Recommendation.

\_\_\_\_\_. 1989. Report to the City of Trinidad on the Implementation of the Local Coastal Program.

\_\_\_\_\_. 1981. Statewide Interpretive Guidelines.

\_\_\_\_\_. 1980. Zoning Chapter of LCP Manual.

Sedway Cook Associates. 1986. Consultant's Recommendations for California Coastal Commission LCP Review Program.

University of California. Institute of Marine Sciences. No Date. Responding to Oregon's Shoreline Erosion hazards: Some Lessons Learned from California.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1978. State of California Coastal Zone Management Program and Final Environmental Impact Statement.

## **CONNECTICUT**

State of Connecticut. Department of Environmental Protection. 1988. Coastal Management in Connecticut Beyond the First Decade.

\_\_\_\_\_. 1995. Long Island Sound Programs and Accomplishments.

\_\_\_\_\_. 1995. Office of Long Island Sound Programs Strategic Plan 1995-1997.

\_\_\_\_\_. 1992. Final Assessment of the Connecticut Coastal Management Program: Section CZMA.

\_\_\_\_\_. 1992. Connecticut Coastal Management program: Final Strategy: Section 309.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1980. State of Connecticut Coastal Zone Management Program and Final Environmental Impact Statement.

## **DELAWARE**

Information : state survey/ Sarah Cooksey 1/18, Robert Henrey1/19, and Maria Sadler1/20Delaware Coastal Management Program.

State of Delaware. 1992. Section 309 Assessment.

\_\_\_\_\_. Coastal Management Act.

\_\_\_\_\_. 1992.Delaware Coastal Management Program Enhancements. A Multi- Year Strategy to Improve Coastal Resource Management: A Response to Section 309 of the Federal Coastal Zone Management Act Reauthorization of 1990.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Delaware Coastal Zone Management Program and Final Environmental Impact Statement.

US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

## **FLORIDA**

A Coastal Barriers Resource Manual. Federal and State Highlights. November 1986. Financial assistance for publication provided by Florida Department of Environmental Regulations and Coastal Zone Management Act of 1972, as amended, administered by Coastal Resource Management, NOAA, and the Florida Department of Community Affairs.

Beaches - The Official Journal of the Florida Shore and Beach Preservation Association. Autumn 1994. Editor: Stan Tait.

Beachfront Properties Under Public Ownership Inventory. February 1994.

Funds for project provided by Department of Community Affairs, Florida Coastal Management Program, using funds made available through the NOAA under CZMA of 1972, as amended.

Conservation and Recreation Lands 1995 Annual Report. Prepared by Office of Environmental Services. Division of State Lands. Department of Environmental Protection in cooperation with Land Acquisition Advisory Council

Florida's Sandy Beaches - An Access Guide. 1985. Published with the assistance of DNR, DCM, State of Florida DER. Additional funding was provided by NOAA. University Presses of Florida - University of West Florida Press/ Pensacola.Florida Statutes.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.State of Florida. 309 Assessment.State of Florida. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

US Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Florida Coastal Zone Management Program and Final Environmental Impact Statement. August 1981.

## **GUAM**

Territory of Guam. Public Law 13-154

Territory of Guam. Bureau of Planning. 1992. Final 309 Assessment.

\_\_\_\_\_. 1992. Final 309 Strategy.

\_\_\_\_\_. 1992. MEMO on State Hazards Management Efforts.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1979. Guam Coastal Zone Management Program and Final Environmental Impact Statement.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1994. Guam Coastal Zone Management Program and Final Environmental Impact Statement. - Amendments to Volumes 1 & 2.

## **HAWAII**

State of Hawaii. Coastal Management Program. 309 Assessment.

\_\_\_\_\_. 309 Strategy.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

## **LOUISIANA**

Graber, Peter, H.F. contract with NOSDACW 39-91 and DACW 39-91-17-5396. Greenbae, California.

Louisiana Department of Natural Resources, Coastal Management Division and Rodney E. Emmer, et. al. 1991. Preliminary Assessment of the Louisiana Coastal Management Program. Louisiana

Department of Natural Resources. Title 43: Natural Resources. (Louisiana Coastal Use Guidelines).

Louisiana Department of Natural Resources, Office of Coastal Restoration and Management, Coastal Restoration Division, Federal Assistance Section 1995. Summary of the Completed State Funded Coastal Wetlands Conservation and Restoration Projects 1986 - 1994. (Draft).

Louisiana Department of Natural Resources. 1995. CWPPRA Bulletin No. 1 Coastal Wetlands Planning, Protection, and Restoration Act - Summary of Priority List 1 - 4. (Draft).

Louisiana Department of Natural Resources. 1994. Status Report for Coastal Wetlands Conservation and Restoration Program.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980. The Year of the Coast. W.H. Freeman and Company. San Francisco. State of Louisiana. 1992. Final Assessment of the Louisiana Coastal Zone Management Program.

\_\_\_\_\_. 1992. Final Section-309 Strategy.

\_\_\_\_\_. 1987. State and Local Coastal Resource Management Act (SLCRMA) of 1978 [1978 La. Acts 361 - codified as amended at La. Rev. Stat. Ann. Section 49-214 et seq.]

\_\_\_\_\_. 1990. Administrative Regulations, La. Admin. Code tit. 43 Section I(701) (707) (721)(723).

\_\_\_\_\_. 1993. Chapter 637.

\_\_\_\_\_. 1993. Chapter 970

US Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960-2010.

US Department of Commerce, NOAA, OCZM and State of Louisiana. 1980. State of Louisiana Coastal Management Program and Final Environmental Impact Statement.

## MAINE

Normandeau Associates, Inc. For U.S. Army Corps of Engineers. 1994. A Dredged Material Management Study for Coastal Maine and New Hampshire.

State of Maine. Coastal Barrier Resources System. Chapter 21 Sections 1901-1905

State of Maine. 1986. Public Laws of the State of Maine As Passed by the 112 Legislature at the Second Regular Session. January 8, 1986 to April 16, 1986.

\_\_\_\_\_. Bureau of Public Lands. 1993. Cutler Coast Unit Management Plan.

\_\_\_\_\_. 1991. Dodge Point Unit Management Plan.

State of Maine. Department of Conservation. Land Use Regulation Commission. 1990. Amendment of the Comprehensive Land Use Plan Regarding the Development and Conservation of Lakes in Maine's Unorganized Areas.

\_\_\_\_\_. 1995. Background Regarding the Proposed Revision of the Maine Land Use Regulation Commission's Comprehensive Land Use Plan.

\_\_\_\_\_. 1991. Land Use Districts and Standards: For Areas Within the Jurisdiction of the Maine Land Use Regulation Commission. Chapter 10 of the Commission's Rules and Standards. Land Use Regulation Commission.

\_\_\_\_\_. 1983. Land Use Plan: For Areas Within the Jurisdiction of the Maine Land Use Regulation Commission.

\_\_\_\_\_. 1995. Revised Comprehensive Land Use Plan for Areas within the Jurisdiction of the Maine Land Use



regulation Commission. Vol. I: Issues and Policies. and Vol II: Characterization of Resources  
(Draft for public comment)

\_\_\_\_\_. 1995. Statutes  
Administered by Maine Land Use Regulation Commission. As Amended through the 117th  
Legislature First Regular Session, 1995.

State of Maine. Department of Conservation. 1987. 1986: The Year In Review- Activities of the  
Maine Geological Survey.

\_\_\_\_\_. 1990. Coastal Sand Dune Maps.

State of Maine. Department of Environmental Protection. 1987. Department Order for The  
Atlantic Condominiums, Old Orchard Beach, Maine.

\_\_\_\_\_. 1995. Mandatory Shoreland Zoning Act.  
Title 38 M.R.S.A. Sections 435 through 449.

\_\_\_\_\_. 1993. Natural Resources Protection Act:  
Coastal Sand Dunes Rules Chapter 355.

\_\_\_\_\_. 1995. Natural Resources Protection Act:  
Permit By Rule Standards Chapter 305.

\_\_\_\_\_. 1995. Natural Resources Protection Act:  
38 M.R.S.A Sections 480-A to 480-X.

\_\_\_\_\_. 1994. State of Maine Guidelines for  
Municipal Shoreland Zoning Ordinances: 06-096 Department of Environmental Protection  
Chapter 1000.

\_\_\_\_\_. 1992. Final Section 309 Assessment.

\_\_\_\_\_. 1992. Maine Coastal Program Section  
309 Strategy.(Revised Nov. 1992)

\_\_\_\_\_. 1996. "Application Tracking System  
(ATS) for Coastal Sand Dune and Coastal Wetland Applications in the Coastal Zone 1/1/88-  
12/21/95" and Permit By rule (PBR) Notification reports selected data on riprap and sand dune  
activities 5/92-12/95" provided by Kathy Jensen.

\_\_\_\_\_. 1996. "Complaints Received in Maine's  
Coastal Zone 1/1/84 to 12/31/95" provided by Kathy Jensen.

State of Maine. Land for Maine's Future Board. 1990. Biennial Report: February 1990.

\_\_\_\_\_. 1995. Biennial Report: January 1995.

State of Maine. Maine Land Use Regulatory Commission. 1991. An Inventory and Analysis for  
Monhegan Plantation.

\_\_\_\_\_. 1996. Data Base Information on Land  
Use Regulation Commission building permit activities since 1972 provided by Henry G. Nichols.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of  
Coastal Zone Management. 1978. Maine's Coastal Program :Final Environmental Impact  
Statement.

## **MARYLAND**

Code of Maryland.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

State of Maryland. 309 Assessment. State of Maryland. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Maryland Coastal Zone Management Program and Final Environmental Impact Statement. 1978

## **MASSACHUSETTS**

State of Massachusettes. Coastal Management Program. 309 Assessment:

\_\_\_\_\_. 309 Strategy.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

## **MICHIGAN**

Atlas of Critical Dunes. February 1989. Michigan Department of Natural Resources, Land and Water Division. Michigan's Coastal Resources.

Michigan Department of Natural Resources, Land and Water Division. Natural Resources and Environmental Protection Act (excerpts) Act 451 of 1994. Part 353. Sand Dunes Protection and Management.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

State of Michigan. 309 Assessment. State of Michigan. 309 Strategy.

\_\_\_\_\_. The Shorelands Protection and Management Act. Act 245 of 1970.

Michigan Department of Natural Resources, Land and Water Division.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

## **MISSISSIPPI**

Information: state survey / Jerry Mitchell. Bureau of Marine Resources. January 9, 1996 at 1:30 pm.

Bureau of Marine Resources Department of Wildlife, Fisheries, and Parks. 1992.

State of Mississippi Section 309 Enhancement Grant Program: Volume 1- Assessment and Volume 2 - Strategy.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

US Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 201

## **NEW HAMPSHIRE**

State of New Hampshire. Code of Administrative Rules. Wetlands Board. Undated. Chapter wt 300- Criteria and Conditions. Chapter wt 100 Organizational Rules, wt 400 Shoreline Structures. Chapter wt 600 Tidal Wetlands.

State of New Hampshire. Department of Environmental Services. 1994. Environmental Fact Sheet: NHDES Technical Bulletin NHDES-CO-1994-2 and Table 2 Minimum Shoreland Protection Standards Under the CSPA (RSA, 483-B)

\_\_\_\_\_. Water Supply and Pollution Control Division. 1995. Quarterly Reports. Subsurface Water Quality Bureau: Inspections, Monitoring and Surveillance. July-Sept. 1995, Oct-Dec. 1995. By Dennis Plante, Denise Frappier, James Spaulding, Stephen Larson

\_\_\_\_\_. Wetlands Board. 1995. Quarterly Reports to NH Coastal Program. 1995-September 1995 and October 1995-December 1995. By Frank Richardson and Dori Wiggin on Wetland Permit Inspections and Monitoring.

\_\_\_\_\_. Wetlands Board. 1996. Wetlands Impact Activity Report (5/7/96) and Impact Tracking Database Screen. (Provided by Tracey Boisvert)

State of New Hampshire. Department of Resources and Economic Development. 1996. DRED Property List as of April 1, 1996 (computer print-out)

State of New Hampshire. New Hampshire Coastal Program. 1992. Coastal Program Bulletin: Endangered and Threatened Birds in the Coastal Zone March 1992.

\_\_\_\_\_. Undated. Excerpt from Project #85, Assessment, Impact and Control of Shoreline Change Along New Hampshire's Tidal Shoreline, "Hampton Harbor Inlet," p. 107.

\_\_\_\_\_. 1995. Inventory of Projects Receiving Funding Assistance Through the New Hampshire Coastal Program 1978-1995. (revised 1995)

\_\_\_\_\_. 1992. Final Section 309 Assessment.

\_\_\_\_\_. 1992. Final Section 309 Strategy.

\_\_\_\_\_. 1994. "Table 1 Status of Shoreland Protection and Other Ordinances in the NH Coastal Communities."

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1982. New Hampshire Coastal Program Ocean and Harbor Segment and Final Environmental Impact Statement.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1988. New Hampshire Coastal Program -Remainder of Coast and Final Environmental Impact Statement.

## **NEW JERSEY**

State of New Jersey Coastal Permit Program Rules NJAC 7:7-1.1 et seq. (incorporating amendments through October 16, 1995). prepared by State of New Jersey, Department of Environmental Protection, Land Use Regulation Program.

New Jersey's Coastal Enhancement Program: Final Assessment Nomination Document. January 1992. prepared by the Office of Regulatory Policy, Department of Environmental Protection and Energy.

New Jersey's Coastal Enhancement Draft Multi-year Strategy. March 1992. prepared by the Office of Regulatory Policy, Department of Environmental Protection and Energy.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

US Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. New Jersey's Coastal Zone Management Program and Final Environmental Impact Statement. August 1980.

US Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

## **NEW YORK**

State of New York.Design of Long Island South Shore Erosion Monitoring Program.

Long Island Regional Planning Board. December 1991.Draft of Long Island Sound Regional Management Report (excerpts).

Erosion and Flooding Hazards. Emergency Response to Coastal Storms. Final Report Volume I and Long-Term Strategy, Final Report Volume II. September 1994.

Governor's Coastal Erosion Task Force.Proposed Long Island South Shore Hazards Management Program. Counties of Nassau and Suffolk, New York. 1989.

Long Island Regional Planning Board and New York Coastal Program, Division of Coastal Resources and Waterfront Revitalization. New York Department of State.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

South Shore Mainland Hazards Management Program. Final Report. March 1994. Long Island Regional Planning Board and New York Coastal Program, Division of Coastal Resources and Waterfront Revitalization. New York Department of State.

State of New York. 309 Final Assessment.

State of New York. 309 Final Strategy.

Town of Southold Erosion Management Plan. November 1995. New York Department of State, Division of Coastal Resources- Town of Southold. Allee King Rosen and Fleming, Inc. Moffatt and Nichol, Engineers with the Sarotoga Association.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. New York Coastal Zone Management Program and Final Environmental Impact Statement. August 1982.

#### **NORTH CAROLINA**

Brower, David J. and James E. Wuenschel. Special Area Management in the North Carolina Coastal Zone. January 1994.

North Carolina Department of Environment, Health, and Natural Resources. Heath, Milton S. Jr., and David Owens. North Carolina Law Review. Coastal Management Law in North Carolina. 1974-1994. Volume 72. Number 6. September 1994.

North Carolina Law Review Association. North Carolina Administrative Code. Priddy, Loie E., and Rick Carraway. The Final Report and Recommendations to the Coastal Resources Commission. Technical Services Section, Division of Marine Fisheries. North Carolina Department of Natural Resources and Community Development. September 1978.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco. State of North Carolina. 309 Assessment. State of North Carolina. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

US Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. North Carolina Coastal Zone Management Program and Final Environmental Impact Statement. 1978.

#### **NORTHERN MARIANAS**

Commonwealth of Northern Marianas. Coastal Management program. 309 Assessment.

309 Strategy.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Coastal Zone Management Program and Final Environmental Impact Statement.

#### **OREGON**

Crook, Christianna. 1979. An Introduction to Beach and Dune Physical and Biological Processes.

Good, James, W. 1994. "Shore Protection Policy and Practices in Oregon: An Evaluation of Implementation Success." Coastal Management. Vol. 22, No.4, pp.325-352

Komar, Paul. 1979. Physical Processes and Geologic Hazards on the Oregon Coast.

State of Oregon. Department of Geology and Mineral Industries. 1992. Oregon Geology, Vol. 54, Number 1. "Ocean Processes and Hazards Along the Oregon Coast" by Paul Komar.

State of Oregon. Department of Land Conservation and Development. 1994. Inventory for Oregon's Rocky Shores.

\_\_\_\_\_. Undated. Oregon Coastal Management Program.

\_\_\_\_\_. Undated Oregon Coastal Management Program. Appendix

\_\_\_\_\_. Oregon Coastal Management Program: A Citizens Guide

\_\_\_\_\_. 1995. Oregon Rocky Shores Natural Resource Inventory

\_\_\_\_\_. 1995. Oregon's Statewide Planning Goals and Guidelines: 1995 Edition.

\_\_\_\_\_. 1995. Rocky Shore Communications Strategy.

\_\_\_\_\_. 1994. Territorial Sea Plan.

\_\_\_\_\_. 1995. Unpublished material on local setback requirements from Emily Toby.

State of Oregon. Department of Parks and Recreation. Undated. Oregon State Parks Guide.

\_\_\_\_\_. 1996. Sites and Deedbook Acres by Management Unit.

State of Oregon. Department of Transportation. Official State Map 1995-1996: Oregon.

U.S. Department of Commerce. NOAA. OCRM. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. Evaluation Findings of the Oregon Coastal Management Program for the Period through.

\_\_\_\_\_. 1982. Evaluation Findings of the Oregon Coastal Management Program for the Period February 1981 through February 1982.

\_\_\_\_\_. 1984. Evaluation Findings of the Oregon Coastal Management Program for the Period February 1982 through August 1983.

\_\_\_\_\_. 1988. Evaluation Findings of the Oregon Coastal Management Program for the Period February 1985 through January 1987.

\_\_\_\_\_. 1990. Evaluation Findings of the Oregon Coastal Management Program for the Period From February 1987 through May 1990.

\_\_\_\_\_. 1991. Evaluation Findings of the Oregon Coastal Management Program for the Period From June 1990 through February 1993.

U.S. Department of Commerce, NOAA, OCZM. 1977. State of Oregon Coastal Management Program Final Environmental Impact Statement.

U.S. Soil Conservation Service. 1975. Beaches and Dunes of the Oregon Coast.

## **PENNSYLVANIA**

Christerson, Neil. 1995. MEMO on Pennsylvania for the National CZM Effectiveness Study: RPIs and Amendments; Performance Reports; Final Reports and Closeout Reports.

Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Water Resources Management, Division of Coastal Zone Management. 1991. Pennsylvania Coastal Zone Management Program.

\_\_\_\_\_. 1992. Assessment of the Pennsylvania Coastal Zone Management Program.

\_\_\_\_\_. 1995. CZM Project List.

\_\_\_\_\_. 1995. "Pennsylvania Coastal Zone Management Program" as part of Coastal States Organization briefing packet for Congress.

\_\_\_\_\_. 1994. Pennsylvania 309 Strategy Revisions.

\_\_\_\_\_. 1992. Strategy of the Pennsylvania Coastal Zone Management Program.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1980. Commonwealth of Pennsylvania Coastal Zone Management Program and Final Environmental Impact Statement.

## **PUERTO RICO**

Puerto Rico. Coastal Management Program. 309 Assessment.

\_\_\_\_\_. 309 Strategy.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Puerto Rico Coastal Zone Management Program and Final Environmental Impact Statement.

## **RHODE ISLAND**

State of Rhode island. Coastal Management Program. 309 Assessment.

\_\_\_\_\_. 309 Strategy.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1978. State of Rhode Island Coastal Management Program and Final Environmental Impact Statement.

## **SOUTH CAROLINA**

Dean, R.G. 1987. Coastal Armoring: Effects, Principles and Mitigation.

Duke University. 1990. Recovering From Hugo: Preparing for Hilda. Hurricane Damage Mitigation Field Trip Guide. Department of geology, Program for the Study of Developed Shorelines.

Fairbridge, Rhodes W. 1989. Climate Warming and Rising Sea Level. NASA-GISS and Columbia University.

Kana, Timothy W. 1988. Beach Erosion in South Carolina.

\_\_\_\_\_. 1990. Conserving South Carolina Beaches Through the 1990s: A Case for Beach Renourishment.

National Committee on Property Insurance. 1988. America's vanishing Coastlines: A New Concern for the Voluntary and Residual Property Insurance Market.

Smith, Jack Newman. 1991. "Analysis of the Regulation of Beachfront Development in South Carolina." South Carolina Law Review, Vol.42, pp.717-742.

State of South Carolina. 1992. South Carolina's Beachfront Management Plan.

\_\_\_\_\_. 1977. South Carolina Coastal Management Act. Code of Laws of South Carolina

\_\_\_\_\_. 1988. Beachfront Management Act. Code of Laws of South Carolina.

\_\_\_\_\_. 1990. Beachfront Management Act Amendments. Code of Laws of South Carolina.

\_\_\_\_\_. Office of Ocean and Coastal Resources Management. No date. Coastal Erosion in South Carolina (internal staff paper).

\_\_\_\_\_. 1992. Final Assessment of the South Carolina Coastal Zone Management Program.

\_\_\_\_\_. 1992. Final Section 309 Strategy.

\_\_\_\_\_. 1995. General Guide to Environmental Permitting in South Carolina.

\_\_\_\_\_. 1995. OCRM Regulations: Rules and Regulations for Permitting in the Critical Areas of the Coastal Zone.

\_\_\_\_\_. 1995. Policies and Procedures of the South Carolina Coastal Management Program.



- \_\_\_\_\_. 1994. Revised Section 309 Strategy.
- \_\_\_\_\_. 1995. South Carolina's Annual State of the Beaches Report.
- \_\_\_\_\_. 1994. South Carolina's Coastal Zone Management Act: Coastal Tidelands and Wetlands: Chapter 39 of Title 48 of the 1976 Code as Amended.
- US Army Corps of Engineers. 1993. Water Resources Development in South Carolina 1993.
- US Department of Commerce, NOAA. 1975. The Coastline of the United States
- US Department of Commerce, NOAA, OCRM. 1988. Amendment No.1 to the South Carolina Coastal Management Program: Inclusion of the 1988 Beach Management Act, Environmental Assessment & Preliminary Findings of Approvability.
- \_\_\_\_\_. Undated. Amendments to the 1977 Coastal Management Act.
- \_\_\_\_\_. 1990. Coastal Management Solutions to Natural Hazards, Technical Assistance Bulletin #103.
- \_\_\_\_\_. 1981. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period September 1979 through October 1980.
- \_\_\_\_\_. 1982. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period November 1980 Through January 1982.
- \_\_\_\_\_. 1984. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period February 1982 to November 1983.
- \_\_\_\_\_. 1985. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period November 1983 through November 1984.
- \_\_\_\_\_. 1988. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period November 1984 through May 1987.
- \_\_\_\_\_. 1991. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period June 1987 through September 1990.
- \_\_\_\_\_. 1994. Final Evaluation Findings for the South Carolina Coastal Management Program for the Period October 1990 through November 1993.
- US Department of Commerce, NOAA, ORCA. 1992. Building Along America's Coasts.
- \_\_\_\_\_. 1990a, 50 Years of Population Change.
- US Department of Commerce, NOAA, OCZM and State of South Carolina Coastal Council. 1979. State of South Carolina Coastal Management Program and Final Environmental Impact Statement.
- U.S. Bureau of the Census. 1991k. "Coastal County Populations."
- \_\_\_\_\_. 1991g. Statistical Abstract of the United States:1991,(111th edition)

\_\_\_\_\_. 1995. Statistical Abstract of the United States: 1994, (xx edition)

## **VIRGIN ISLANDS**

Territory of the Virgin Islands of the United States. 1991. Preliminary Assessment of the Virginia Islands of the United States Coastal Zone Management Program: Section 309 Coastal Zone Enhancement Grants Program.

\_\_\_\_\_. 1996. Virgin Island Coastal Management Program. Performance Report Permit Chart for State CZm Agencies with Direct Permitting Authority: St. Croix; St. Thomas; St. Johns Districts. Oct. 1992-Sept. 1995. (Provided by Jewle Griffin, OCRM)

\_\_\_\_\_. 1978. Chapter 21 Virgin Island Coastal Management Act.

\_\_\_\_\_. 1987. Chapter 13. Environmental Protection.

\_\_\_\_\_. 1992. 309 Final Strategy.

\_\_\_\_\_. 1992. Rules and Regulations, Virgin Island Coastal Zone Management, Title 12, Chapter 21 VIRR, Chapter 900 through 913, Amendments to Subchapter 910, Subchapter 913.

Towle, Edward L. and Richard D. Volk. 1994. Case Study: From Theory to Practice with Virgin Islands Coastal Management: A Retrospective View. Interamerican Development Bank 5th Consultative Meeting on Environment.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. 1979. The Virgin Islands Coastal Management Program and Final Environmental Impact Statement.

## **VIRGINIA**

An Assessment of the Barrier Island Policy and the Coastal Primary Sand Dune Act. December 1992. Prepared by Chris W. Frye.

Virginia council on the Environment's Coastal Resources Management Program.

Laws of Virginia Related to Submerged Lands, Wetlands, and Coastal Primary Sand Dunes and Beaches. 1992 Edition.

Marine Resources Commission. Newport News, Virginia.

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco. Shoreline Development BMPs. 1994.

Virginia Marine Resources Commission. Subaqueous Guidelines. 1986.

Virginia Marine Resources Commission. Wetland Guidelines. 1993.

Department of Wetlands Ecology, Virginia Institute of Marine Sciences, College of William and Mary and Habitat Management Division, Virginia Marine Resources Commission.

State of Virginia. 309 Assessment. State of Virginia. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

US Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Virginia Coastal Zone Management Program and Final Environmental Impact Statement. 1985.

## **WASHINGTON**

Brunengo, Matthew. 1994. Washington Geology: Geologic Hazards and the Growth Management Act. State of Washington. Dept. of Natural Resources. Forest Practices Division. (vol. 22, no.2, July 1994)

Carson, Brent. No date. Regulation of Critical Areas and Natural Resource Lands Under the Growth Management Act. (Buck and Gordon Law Firm)

State of Washington. Chapter 90.58 RCW. Shoreline Management Act of 1971 As Amended in 1995.

State of Washington. Dept. of Ecology. 1995/1996. Coastal Currents. (Vol. XIV No. 4 and VOL. XX No.1)

\_\_\_\_\_. 1994. Coastal Erosion Management Strategy: Coastal Erosion Management Studies, Volumes 1-9:

Vol. 1 Coastal Erosion Management Studies in Puget Sound Washington: Executive Summary.

Vol. 2 : Annotated Bibliographies on Shoreline Hardening Effects, Vegetative Erosion Control, and Beach Nourishment.

Vol. 3: Inventory and Characterization of Shoreline Armoring, Thurston County, Washington 1977-1993.

Vol. 4: Engineering Geotechnical techniques for Shoreline Erosion Management in Puget Sound.

Vol. 5: Shoreline Armoring Effects on Physical Coastal Processes in Puget Sound, Washington.

Vol. 6 1994. Policy Alternatives for Coastal Erosion Management.

Vol. 7 Shoreline Armoring Effects on Coastal Ecology and Biological Resources in Puget Sound, Washington.

Vol. 8: Management Options for Unstable Coastal Bluffs in Puget Sound, Washington.

Vol. 9: Regional Approaches to Address Coastal Erosion Management.

\_\_\_\_\_. 1995. Coastal Zone Assessment: An Annotated Bibliography of the Documentary Literature.

- \_\_\_\_\_. 1996. The Cumulative Environmental Effects of Shoreline Erosion Control and Associated Land Clearing Practices, Puget Sound, Washington. (Report 94-83)
- \_\_\_\_\_. 1994. Geologically Hazardous Areas (October 18, 1994 version)
- \_\_\_\_\_. 1991. Population and Development Trends in Washington's Coastal Zone.
- \_\_\_\_\_. 1995. Indicators of Coastal Zone Quality: An Annotated Bibliography.
- \_\_\_\_\_. 1994. Shoreline Administrator's Manual. (2nd Edition)
- \_\_\_\_\_. 1991. Shoreline Bluff and Slope Stability: Management Options. (shorelands Technical Advisory paper No.2)
- \_\_\_\_\_. 1985. The Shoreline Management Act: An Overview of the Trends.
- \_\_\_\_\_. 1996. Shoreline Management Act Regulatory Reform. (Ecology Fact Sheet 95-108) and (Ecology Publication 96-102)
- \_\_\_\_\_. 1994. Shoreline Master Program Handbook (2nd Edition)
- \_\_\_\_\_. 1983. Shoreline Master Program Handbook.
- \_\_\_\_\_. 1995. Washington State Coastal Zone Management Program.
- \_\_\_\_\_. 1976. Washington State Coastal Zone Management Program- Amendments.
- \_\_\_\_\_. 1992. Washington State Coastal Zone Section 309 Assessment and Strategy. Volume 1, Assessment.
- \_\_\_\_\_. 1992. Washington State Coastal Zone Section 309 Assessment and Strategy. Volume 2, Strategy.
- State of Washington. 1993. Growth Management Act. RCW
- \_\_\_\_\_. No Date. Chapter 365-190 WAC Minimum Guidelines to Classify Agriculture, Forest, Mineral Lands, and Critical Areas.
- U.S. Department of Commerce. NOAA. 1975. State of Washington Coastal Zone Management Program Final Environmental Impact Statement.

## **WISCONSIN**

Ringold, Paul L. and John Clark. 1980. The Coastal Almanac for 1980 - The Year of the Coast. W.H. Freeman and Company. San Francisco.

State of Wisconsin. 309 Assessment. State of Wisconsin. 309 Strategy.

U.S. Department of Commerce, NOAA, National Ocean Service. 1990. A Special Earth Week Report: 50 Years of Population Change along the Nation's Coasts 1960 - 2010.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of Coastal Zone Management. Wisconsin Coastal Zone Management Program and Final Environmental Impact Statement.

Water Quality Standards for Wetlands - A Regulator's Guide to NR 103. September 1992.

Wisconsin Department of Natural Resources. Wisconsin Statutes.

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